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I N D E X

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WITNESSES ON BEHALF OF THE DEFENDANTS

TIMOTHY SULLIVAN, Ph.D.

Continued Cross-Examination by Mr. Bullock

10852

Redirect Examination by Mr. George

10950

TERRY PEACH

Testimony by Videotaped Deposition

10961

1 Tuesday, January 12, 2010

2 * * * * *

3 THE COURT: Mr. Bullock.

4 MR. BULLOCK: Thank you, Judge.

5 **CONTINUED CROSS-EXAMINATION**

6 **BY MR. BULLOCK:**

7 Q. Doctor, before we get to the picture and the
8 question that you had an opportunity to contemplate,
9 first of all, do you recall -- well, actually in terms
10 of that picture, do you recall where on the river that
11 was?

12 A. Well, we canoed two reaches of the scenic
13 river in Oklahoma. I couldn't tell you the exact
14 location, no.

15 Q. But all on this canoe trip -- by the way, was
16 it a day? A half day?

17 A. It was a half day to a half day-plus.

18 Q. Okay. Now, were you in the back of the canoe
19 or the front of the canoe?

20 A. I was in the back --

21 Q. Okay.

22 A. -- of the canoe in which I was sitting.

23 There were other canoes there also.

24 Q. Have a good day?

25 A. For the most of the day. The very tail end

1 of it was a little bit disconcerting. We can talk
2 about that if you'd later.

3 Q. We'll talk about that later. Leave us
4 hanging.

5 MR. BULLOCK: But, you know, one thing
6 I've learned is don't ask when they dangle a lure.

7 THE COURT: That was a teaser,
8 Mr. Bullock.

9 MR. BULLOCK: I saw it.

10 Q. (BY MR. BULLOCK) Now, who did take this
11 picture?

12 A. The pictures were discussed often and
13 sometimes at length by myself, Dr. Vic Bierman, John
14 Elrod --

15 Q. Doctor, I'm sorry. I was asking who took the
16 picture.

17 A. Well, that's what I'm trying to respond to.
18 I need to provide a little bit of background. I don't
19 remember exactly who took the photo but I'm pretty
20 sure I know so I can tell you --

21 Q. Well, I don't want any -- I'm not asking for
22 guessing. If you don't know, you don't know.

23 A. I'm pretty sure I know. So I can tell you
24 that, if you want.

25 Q. Well, then who took the picture?

1 A. I believe it was Scott McDaniel.

2 Q. Was that the general process that day, that
3 the lawyers took the pictures?

4 A. One of the lawyers did the photography; I
5 think it was Mr. McDaniel. I don't remember for sure
6 if -- a scientist may have also had a camera. I think
7 someone did but I'm not sure.

8 Q. Okay. And who was on this float trip -- or
9 these two float trips?

10 A. Well, I can certainly remember some of the
11 people but not all.

12 Q. Okay. And the ones you remember?

13 A. Okay. Mr. Elrod and Mr. McDaniel, Mr. Tim
14 Jones, Dr. Vic Bierman, Dr. Billy Clay, I think, and
15 Dr. Ron Jarman. I'm pretty sure those are all
16 accurate. I don't know who else.

17 Q. Okay. Do you recall which reaches of the
18 river you canoed that day?

19 A. Well, I remember looking at the reaches on
20 the map, but it's been several years now and I can't
21 tell you exactly what reaches it was.

22 Q. All right. Now, as to the particular picture
23 that we have in front of us, which is DJX633-0031,
24 what I asked you was whether the water along there
25 was, in fact, green?

1 A. Should I look at the screen or should I look
2 at the notebook?

3 Q. All right. Whichever one you believe to be
4 accurate in terms of portraying the picture that you
5 saw, Doctor.

6 A. Okay. Because how it's printed can influence
7 the color.

8 Q. Well --

9 A. I will look at the screen. I can't tell you
10 for sure what the color looked like at this specific
11 location. I did take note --

12 Q. Okay. Thank you.

13 A. -- I did take note of color on the trip --

14 Q. Okay. Now --

15 A. -- but not the specific location.

16 Q. Doctor, then when you represented to the
17 court that this picture was an accurate representation
18 of what you saw that day, you're now telling us that,
19 in fact, it may not have been at least in terms of the
20 colors portrayed?

21 A. No, that's not correct.

22 Q. Okay. Well, let's go on to 633-0105, which
23 is the last of the pictures in that group.

24 A. Should I wait for the screen or should I
25 look at the --

1 Q. Doctor, I want your testimony as to what is
2 accurate, okay?

3 A. Well --

4 Q. I'm not asking what -- the pictures are
5 merely representations of what you saw, are they
6 not?

7 MR. GEORGE: Objection; argumentative.

8 MR. BULLOCK: I'm sorry, Judge. I'll
9 back off a little bit.

10 THE COURT: Rephrase, please.

11 Q. (BY MR. BULLOCK) Doctor --

12 A. Well, I --

13 Q. Just a second, Doctor. What I would like for
14 you to do is to tell me, between the picture on the
15 screen and the one in the book that the judge and the
16 record has, which is the more accurate in color -- in
17 representing the colors that day?

18 A. I'm sorry. Am I back to the first photo now?

19 Q. No. We're at 633-0105.

20 A. Okay. All right. Well, I mean, there are
21 two issues you're asking me about. You're asking me
22 representative that day and you're asking me about
23 this particular location.

24 Q. No. I'm asking you what you saw that day as
25 to which one of those images best represents what you

1 saw that day.

2 A. At this location or in general?

3 Q. At that location.

4 A. At this -- I cannot tell you for any of these
5 specific locations what color I noted. I can tell you
6 that I did pay attention to color on the trip for the
7 entire trip but -- and I do remember what I'm seeing
8 on the screen here that area that was -- that had a
9 very steep cut bank. I do remember that area.

10 Q. I --

11 A. But I can't tell you if the color that's on
12 the screen corresponded to that particular area on
13 that day several years ago. I'm sorry, I can't do
14 that.

15 Q. Okay. Now let me ask you about the exhibit
16 for the record.

17 The exhibit, in fact -- and this would be the
18 paper, what's going to go before the court --

19 A. Okay.

20 Q. -- goes before this court or any others, that
21 is green, isn't it?

22 A. On the one in front of me now?

23 Q. Yes.

24 A. It definitely has a green tint to it, yes.

25 Q. Okay. Now, in this, you testified on direct

1 that the principle constituent of concern in the
2 IRW -- in the waters of the IRW is, in fact,
3 phosphorus; correct?

4 A. I testified to that when, sir? In my --

5 Q. In your direct testimony.

6 A. I don't remember testifying to that in my
7 direct testimony. I mean, if I was asked the
8 question, I wouldn't be surprised if I answered it
9 that way, but I don't remember testifying to that.

10 Q. Then let me ask you: Is the principle issue
11 of concern in the waters of the IRW as you understand
12 it -- or let me rephrase.

13 Is a principle issue of concern, regarding
14 the waters of the IRW, its phosphorus content?

15 A. I agree with that.

16 Q. Okay. In your opinion, are the waters of the
17 Illinois River Watershed impacted from phosphorus?

18 A. Are they impacted from phosphorus?

19 Q. Yes.

20 A. I didn't do any analyses to evaluate impact.
21 I looked at -- at water chemistry, the phosphorus
22 concentration in the water, at great length in many
23 locations, but I didn't address the impact issue.

24 Q. Well, from your study of concentrations of
25 phosphorus, did you determine whether or not the

1 Illinois River has been impacted by the levels of
2 phosphorus found in it?

3 A. That's not a determination that I made in my
4 work for this case.

5 Q. Well, then you have no opinion as to that?

6 A. No.

7 Q. Okay. And so when you did the comparative
8 levels of phosphorus in the various waterbodies, you
9 were not suggesting that the Illinois River and also
10 Lake Tenkiller are not impacted by the levels of
11 phosphorus found in them, were you?

12 A. I was not making an evaluation of whether or
13 not they were impacted; I was comparing chemistry.

14 Q. As an expert in all of the various fields to
15 which you've testified to, what would you expect to be
16 the environmental effects of high phosphorus levels in
17 an Ozark stream?

18 MR. GEORGE: Objection, Your Honor. The
19 witness has testified that he didn't do that
20 evaluation and it's outside the scope.

21 MR. BULLOCK: What I asked him for is,
22 as an expert what would he anticipate. He clearly has
23 testified rather broadly concerning various pollutants
24 of concern. I'm asking him why they would be of a
25 concern.

1 THE COURT: I think it's a fair
2 question. I'm going to give you some latitude.
3 Overruled.

4 A. I'm sorry, Mr. Bullock. Can you please
5 restate the question?

6 Q. (BY MR. BULLOCK) As a scientist with the
7 broad expertise to which you have testified to here,
8 what are the environmental effects that you would be
9 concerned about from high phosphorus levels in Ozark
10 streams?

11 A. Okay. If you increase the phosphorus
12 concentration in the stream water in a system like
13 this, which is believed to be phosphorus-limited --
14 and I don't argue with that -- if you increase the
15 phosphorus in a stream that's phosphorus-limited, in
16 some places you may get increased growth of algae or
17 macrophytes; other places that may not occur.

18 The reasons why that may not occur at some
19 places would be because something else was limiting
20 the growth of algae or macrophytes other than a
21 nutrient. That could be light. It could be the time
22 that it takes for the algae to grow, for example, with
23 the transport time of the water.

24 So in places where something like light or
25 transport time -- I can't think of any other variables

1 and they would be the main ones in my view -- places
2 where those were not limiting, but rather a nutrient
3 was limiting, then I would expect to see an increased
4 growth of algae.

5 Q. Okay. Now, similarly, would you -- is there
6 concerns about what such P levels -- what effect they
7 could have above dissolved oxygen levels?

8 A. Well, that's -- that's going to depend.
9 That's certainly a possibility --

10 Q. Okay.

11 A. -- depending on the circumstances.

12 Q. All right.

13 A. I can explain the circumstances, if you'd
14 like me to.

15 Q. That's fine, Doctor. And could it also have
16 an impact upon the nature of the fish and the size of
17 fish populations?

18 A. If the productivity of the system was
19 sufficiently high, that's a possibility. It would
20 have to be fairly high for that to occur in my view.

21 Q. Okay. Did you do any work to determine what
22 the background levels of phosphorus are in the waters
23 of the IRW?

24 A. Did I do any work to determine that?

25 Q. Yeah.

1 A. I would say no.

2 Q. Okay. But you limited it to work. Did you
3 do a study or come to that knowledge in any other way?

4 A. Well, I would say that I and many other
5 environmental scientists have general knowledge of
6 what background levels we would expect to see. But
7 it's very -- as I mentioned earlier in my testimony
8 here, that's very difficult to pin that down. Nobody
9 knows for sure what the background levels were, but
10 those of us who work in this field have a sense of
11 what the background levels were.

12 Q. Okay. Now, is your sense specific to the
13 Illinois River Watershed?

14 A. I would say no.

15 Q. Okay. Let's talk about your testimony
16 concerning the drainage of fields.

17 You described in heavy rains that there are
18 basically two different types of drainage that you
19 find, if I understood your testimony. One of those is
20 sheet flow; correct?

21 A. Well, I'm not quite sure what you mean by
22 "drainage," but I do understand what "sheet flow"
23 is.

24 Q. Well, where you end up with more water
25 falling out of the sky than can infiltrate through the

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1 soil for whatever reason, whether it's because the
2 water table is high or because the soils near the
3 surface are saturated, in either case you end up with
4 what you -- you end up with water flowing off the
5 field. And just be sure that you and I are talking
6 the same thing, what is your term for that general
7 phenomena?

8 A. It would be overland flow that would be
9 flowing across the surface.

10 Q. Okay. You get two different types of
11 overland flow. One is the sheet flow; correct?

12 A. There are many ways to slice up this issue of
13 overland flow. If you want to talk about terms that
14 people use, I mean, there are many. "Sheet flow" is
15 one.

16 Q. Okay.

17 A. It's not a term that I've used in this
18 proceeding, I don't believe, but that is a term that
19 is used.

20 Q. It's possible that you used that term, isn't
21 it?

22 A. I don't think so but I could be mistaken.

23 Q. Well --

24 THE COURT: I think he talked about the
25 infiltration and then the saturation at the lower

1 levels where the water table has risen.

2 THE WITNESS: Correct.

3 Q. (BY MR. BULLOCK) Okay. One of the ways that
4 the water can move off of the field, though, is by an
5 phenomena that I've heard referred to as "sheet flow";
6 correct?

7 A. That's correct.

8 Q. And that is just as it describes, water
9 doesn't -- it's not seeking channels, it's just
10 flowing more or less in a sheet towards the lower
11 gradient?

12 A. That is a term that is sometimes used.

13 Q. Okay. Now, you also have what I've heard
14 referred to as the ephemeral streams forming in the
15 fields; right?

16 A. I wouldn't call an ephemeral stream something
17 that's forming in the fields. An ephemeral stream is
18 a stream that's carrying water some of the time but
19 not all of the time.

20 Q. Right, right. But out in those fields you'll
21 have those areas, the low areas, the preferred courses
22 for the water to flow off of the field, will you not?

23 A. Well, there are certainly some fields that
24 would have ephemeral or intermittent streams in
25 them.

1 Q. Okay. And you haven't done any study in the
2 IRW to determine the extent of such a stream network,
3 have you?

4 A. Well, to a large degree, I have.

5 Q. Okay. And where in your report is that? Did
6 you report on that?

7 A. Well, we would have to look through the
8 report to determine to the extent to which I mentioned
9 the high-resolution NHD, National Hydrography Dataset.
10 I believe that it's mentioned in the report but I'm
11 not positive of that.

12 Q. All right. Well, let's talk about in terms
13 of those fields in which these do form.

14 These are little stream networks which exist
15 and, as you say, are dry until you get these heavy
16 rains; correct?

17 A. Well, there are -- the stream network
18 includes streams that carry water all the time, most
19 of the time, and only under heavy rain conditions.
20 That's all part of the stream network.

21 Q. Okay.

22 A. That stream network in some places can be in
23 agricultural settings and other places it's not. So
24 it depends on where we're talking about.

25 Q. Okay. Well, let's talk in agricultural

1 settings.

2 When the heavy rains come, the water will
3 find those channels and flow into the larger streams;
4 right?

5 A. That can certainly occur, yes.

6 Q. Okay. And, in fact, if we looked at a
7 picture of the stream networks of the IRW, it would
8 show third-, fourth-, fifth-, and I think the river
9 itself gets to a sixth-level stream; correct?

10 A. Sixth and seventh.

11 Q. Okay. And the first- and the second-order
12 are these ephemeral streams that we've been talking
13 about; is that true?

14 A. I would not characterize it that way, no.

15 Q. Okay. What are the first- and second-order
16 streams?

17 A. Well, if you're talking about the moderate
18 resolution NHD, which is what most people use for most
19 purposes in my view, the first -- the first- and
20 second-order streams would be what I would consider to
21 be small streams. Some of them may be intermittent.
22 I wouldn't characterize most of them as being
23 intermittent certainly. But if you move to the
24 high-resolution NHD, then you would pick up a larger
25 proportion of streams that would be considered to be

1 intermittent.

2 Q. Okay.

3 A. So that the -- the classification system into
4 Strahler orders depends on the scale at which you're
5 extracting the data to look at it. So it can shift up
6 and down depending on your scale.

7 Q. In terms of, for instance, 40-acre fields,
8 does that resolution go to the point where it charts
9 the drainage networks on that scale?

10 A. It's a good question, Mr. Bullock, but I
11 can't provide you with an answer. I can tell you the
12 scales of the NHD, if you want, but I can't make that
13 mental conversion.

14 Q. But the point being that as you go up
15 the watercourses, that up during high -- during heavy
16 rains, that you have a little gathering systems that
17 much resemble the stream network, as we know it,
18 gathering the waters out of these fields and bringing
19 them to the larger streams; right?

20 A. Well, it's going to depend on the field.
21 It's very site-specific. There are many fields that
22 do not have ephemeral streams in them. There are
23 certainly some fields that do.

24 Q. And have you enumerated the proportion of the
25 two in this watershed?

1 A. I have enumerated the length of stream in
2 this watershed using both the high-resolution and --

3 Q. That's not the question, Doctor.

4 A. So repeat the question, please, sir.

5 Q. Okay. Have you determined the proportion of
6 fields which lack these types of temporary stream
7 networks versus those that don't in the IRW?

8 A. No.

9 Q. Okay. Those types of -- and I'm going to
10 continue to refer to them as "ephemeral
11 streams" -- those types of ephemeral stream networks,
12 they will carry with them certainly the dissolved
13 phosphorus that is found on the fields; right?

14 A. I would not agree to that, no.

15 Q. Well, then they will separate -- the water
16 flowing in those streams will separate out dissolved
17 phosphorus, it won't carry that?

18 A. No. I didn't suggest that, no.

19 Q. Okay. So they will carry dissolved
20 phosphorus that's in the waters where it's laying on
21 the field; right?

22 A. If there's dissolved phosphorus in the
23 stream, then the stream is certainly able to carry
24 that phosphorus. But it's going from the field to the
25 stream I'm having trouble with.

1 Q. Well, that's what I'm working on. As the
2 water falls onto the field, that water moves towards
3 these ephemeral -- towards these drainageways; right?

4 A. Well, in general it probably will, some of it
5 through the ground and some of it perhaps over the
6 surface.

7 Q. Okay.

8 A. And it --

9 Q. And we're talking about those events where
10 it's going to move over the surface. Remember when we
11 began, we talked about that that's what I was focusing
12 on was surface flow?

13 A. I'm sorry, sir. But that's a complete
14 mischaracterization of how the system works.

15 Q. Right now I'm not talking about the system.
16 I'm talking about an aspect of the system. I'm
17 talking about overland flow, as you call it.

18 A. But if overland flow doesn't occur, then it
19 doesn't occur.

20 Q. Doctor, I'm saying that it is occurring. You
21 understand that?

22 A. So you're going to a specific place on a
23 field where overland flow occurs and asking me a
24 question about that; is that the question?

25 Q. No. I'm talking about when there is overland

1 flow, first of all, okay? You understand that?

2 A. Okay. But overland flow is not going to be
3 an entire flow; it's going to be a particular area.
4 So if we can focus on the area, then maybe I can
5 answer the question.

6 Q. Well, Doctor, let's posit that there's
7 overland flow across this field?

8 A. Across the entire field?

9 Q. Yes.

10 A. Well, you can posit that, but it's got no
11 relationship to reality.

12 Q. Okay. Well, we're going to posit that, okay?

13 THE COURT: I mean, there are
14 theoretically areas which in your scenario may be
15 below the water table. Where the water table has
16 risen the entire field may be saturated and you've got
17 overland flow over the entire field; right?

18 THE WITNESS: Well, I certainly can't
19 say that that's impossible but it's not something --

20 THE COURT: All right. That's his
21 hypothesis here.

22 THE WITNESS: Okay.

23 Q. (BY MR. BULLOCK) Okay. And so the water
24 moving in that overland flow will carry at least the
25 dissolved phosphorus that's immediately on the surface

1 of that land, won't it?

2 A. If you have overland flow and there's
3 phosphorus on the surface of the land, then I would
4 expect that some of that phosphorus on the surface
5 could be carried in that overland flow.

6 Q. Well, it will carry the dissolved and it also
7 may or may not cover some particulate phosphorus;
8 correct?

9 A. That would be correct.

10 Q. Okay. Now, just one point here before we
11 move on is that you haven't studied -- your study
12 didn't extend to a study of the groundwater in the
13 IRW, did it?

14 A. No, it did not.

15 Q. Okay. And so when you talk about -- for
16 instance, I think when you were talking about the
17 water running in a ditch, you suggested that it might
18 act something like a disappearing stream, that it
19 might just seep into the ground and cease to flow and
20 then flow underground to stream channels; right?

21 A. Well, not necessarily. I mean, that's a
22 possibility.

23 Q. Okay. That was one possibility you raised in
24 this court, was it not?

25 A. Well, I didn't raise the possibility about

1 whether it would eventually flow into a stream or not.
2 What I raised in this court was the possibility that
3 as you move down the ditch, that that water may
4 infiltrate into the soil at the bottom of that ditch.
5 Where it goes from there is another entire question,
6 and we can talk about that, if you'd like.

7 Q. Okay. You didn't study the subsurface flow
8 in the IRW, did you?

9 A. No. I cut off my study at the bottom of the
10 soils.

11 Q. Okay. And as such, you have no information
12 as to whether phosphorus from the surface is actually
13 finding its way into the groundwater in this
14 watershed, have you?

15 A. That's not something I've addressed here.

16 Q. Okay. So you -- as a scientist, you cannot
17 rule out that phosphorus from the surface is
18 infiltrating and finding its way eventually through
19 the channels of this karst geology into the streams of
20 the IRW, can you?

21 A. Well, only to the extent that I can talk
22 about the soils. Because the soils provide the buffer
23 mechanism to try to minimize or eliminate that and the
24 regulations that dictate how deep the soils have to be
25 in order to provide litter application.

1 Q. But, first of all, as to the actual dynamics
2 of that, you haven't tested as to whether any of that
3 is sufficient to eliminate the phosphorus infiltrating
4 the groundwater, have you?

5 A. Once we get below the soils, then that's
6 outside the area I addressed.

7 Q. Okay. So let's go to the cattle story that
8 you've told us.

9 You testified yesterday that cattle in
10 addition to the transport, as in terms of
11 direct-deposit of phosphorus into the stream, that
12 they also have impacts upon this overland flow issue,
13 did you not?

14 A. Yes. Especially locally near the stream.

15 Q. Okay. They compact the soil?

16 A. In certain areas, they do.

17 Q. Okay. And that would be those cattle trails
18 that you'll see out in any field where the cattle move
19 perhaps between a feeder and water or to their
20 lounging area, those types of areas get compacted and
21 create channelization?

22 A. Those and other areas, yes.

23 Q. Okay. And so when we get these high-flow
24 events -- or these overland flow events that you
25 describe, the water taking whatever dissolved P it

1 might have in it will move into these channels created
2 by the cattle and that will move quickly on
3 downgradient; correct?

4 A. It can move downgradient. The extent to
5 which the water will infiltrate versus provide
6 additional overland flow is going to be site-specific.
7 But if there is the overland flow component, then it
8 will move downgradient for whatever distance until you
9 start to get the infiltration taking over the
10 situation again.

11 Q. Okay. And according to your testimony, I
12 have a vision that all of these cattle trails lead to
13 some running stream. Is that the impression that
14 you're leaving here?

15 A. No.

16 Q. But do they frequently lead to running
17 streams?

18 A. Well, they sometimes do.

19 Q. Okay.

20 A. The cattle trails are not impervious
21 surfaces. They are more compacted perhaps than some
22 of the surrounding terrain. And as a result of that
23 additional compaction, I would expect to see a lower
24 rate of infiltration. But that doesn't tell us
25 whether or not that rate of infiltration is sufficient

1 to accommodate the rainfall that occurs. Sometimes it
2 might be, sometimes not.

3 Q. Well, I was understanding your testimony
4 yesterday as suggesting that cattle increase the
5 transport of phosphorus to streams due to in part
6 channelization. Did I misunderstand your testimony?

7 A. A little bit.

8 Q. Okay. Then let me see if I can sort it out,
9 okay?

10 You haven't tested, as you say, the amount of
11 infiltration from these channels that the cattle
12 create, have you?

13 A. No, I have not done that.

14 Q. Okay. You posit that there may be some
15 infiltration, but absolutely there's added compaction
16 which facilitates overland flow?

17 A. The added compaction increases the risk of
18 overland flow --

19 Q. Okay.

20 A. -- if the storm is large enough.

21 Q. All right. And you also have the issue of
22 the cattle consuming the vegetation on the field,
23 where you talked about the fact that as they eat the
24 grass, the roots become lessened and so they lesson
25 the amount of infiltration in a field; correct?

1 A. If you remove the vegetation, then the
2 infiltration rate will go down, that's correct.

3 Q. Okay. And that's not just in these riparian
4 areas, but that's up in the grazing areas of the
5 field, is it not?

6 A. Well, typically in the grazing areas of the
7 field, you don't find very much landscape that has
8 been so severely trampled that the -- that the
9 vegetation has gone. If it's a severely overgrazed
10 pasture, that certainly can occur but that's not the
11 norm.

12 Q. Well do you recall -- you've testified, have
13 you not, that, in fact, you saw significant amounts of
14 overgrazing in the IRW when you toured it?

15 A. No.

16 *(Discussion held off the record)*

17 Q. (BY MR. BULLOCK) You don't recall that
18 testimony in your deposition?

19 A. Not -- not to substantial amounts. I mean,
20 it varies. There are certainly some fields that I
21 noticed that looked like they're pretty heavily
22 grazed, but I not notice a pattern of severe
23 overgrazing in the pastures at large, no.

24 Q. Well, you saw some anecdotes of it, but you
25 didn't make any systematic study of the extent of

1 it?

2 A. Well, there's a couple of answers to that
3 question. One is is that in the areas that cows
4 frequent, I saw places where the vegetation was
5 completely gone for sure, but those are not in the
6 pastures at large.

7 Q. All right. I'm talking overgrazing.

8 A. In the pastures at large, what I noted was
9 that there were some areas that looked like they were
10 fairly heavily grazed, but I did not come away from
11 that watershed with the impression that there was an
12 overgrazing problem, per se.

13 Q. But that heavily grazing increases the
14 propensity for overland flow; correct?

15 A. It can. It depends on the situation.

16 Q. Okay. Now, the channelization, the reduction
17 in vegetation, and the compaction, Doctor, those are
18 all well-understood phenomena, are they not?

19 A. That's my understanding, yes.

20 Q. Okay. And, in fact, in terms of nutrient
21 usage on pastures, those are foreseeable risks, are
22 they not?

23 A. I would think so.

24 Q. You testified briefly concerning the Arkansas
25 PI index and said that you were not an expert in that.

1 I want to know whether you are aware of whether or not
2 one of the risk factors examined by the PI index,
3 whether there is any -- let me rephrase.

4 In the Arkansas PI index, are you aware of
5 whether or not it takes into account, or whether there
6 is an assessment of, the extent of compaction,
7 channelization, or overgrazing in any particular
8 fields?

9 A. Yes.

10 Q. Okay. And where did you see that?

11 A. That is in the -- in the Arkansas phosphorus
12 index, what it includes is an estimate of runoff risk
13 potential. In calculating that runoff risk potential,
14 they include the vegetation information that would
15 express some of these kinds of issues.

16 Q. Some of them?

17 A. Yes.

18 Q. Is there -- are you saying that in terms of
19 doing the maps of these areas, that there is any
20 assessment of, for instance, a channelization caused
21 by cattle?

22 A. No, I'm not aware of any assessment like
23 that.

24 Q. Okay. And in terms of the on-site assessment
25 of these areas, is it your testimony here that the

1 extent of overgrazing is assessed in that Nutrient
2 Management Plan?

3 A. Are we talking about the phosphorus index or
4 the Nutrient Management Plan?

5 Q. Yes. Well, let's talk about the nutrient
6 management plan, first of all.

7 A. Well, the Nutrient Management Plan uses the
8 phosphorus index. So --

9 Q. I understand. So let's talk first about the
10 Nutrient Management Plan where they do the on-site
11 assessment of these farms, okay?

12 A. Okay. Yep.

13 Q. Are you aware of whether or not those
14 Nutrient Management Plans do an assessment of the
15 health of the compaction -- or the degree of
16 compaction on any particular field?

17 A. Well, there is an assessment of the pasture
18 condition. And as I said -- you correctly stated I'm
19 not an expert on these, but it's my understanding that
20 a trained soil scientist or other trained individual
21 will go out and evaluate these pastures individually
22 and they will provide that information that feeds into
23 the phosphorus index calculation which does include
24 pasture condition as a component of estimating the
25 runoff risk potential.

1 Q. Well, let's -- we'll get -- in fact, I
2 probably jumped the gun on myself. We'll get to
3 those.

4 A. Okay.

5 Q. In terms of cattle, did you do any assessment
6 as to how often cattle have direct access to
7 streams?

8 A. That was one of the things that I had in the
9 forefront of my mind on multiple occasions touring the
10 watershed is to evaluate that issue.

11 Q. Well, did you do any analysis -- what kind of
12 analysis did you do in the Illinois River Watershed to
13 quantify how often cattle have direct access to
14 streams?

15 A. What I did was -- was a crude visual
16 assessment from the air and from the -- and from the
17 ground of what I saw --

18 Q. Did you --

19 A. -- places I went.

20 Q. I'm sorry.

21 A. I did not perform any additional analyses of
22 that information. It was a visual evaluation that I
23 made.

24 Q. You didn't do any quantification of it, did
25 you?

1 A. No, sir.

2 Q. Let me be sure. We're getting double
3 negatives.

4 There was no --

5 A. I did no quantification.

6 Q. Okay. Did you do any documentation of your
7 observations from the air as to the number of pastures
8 that didn't have fences?

9 A. No. I did not count the pastures.

10 Q. Well, did you do any documentation of your
11 observations?

12 A. No.

13 Q. Do you have any idea as to how much of the
14 water -- how much of the Illinois River main
15 stream -- main stem is capable of being used by
16 cattle?

17 A. From what I observed, there was -- and I've
18 observed the same thing in many other places besides
19 the IRW -- there's a rather dramatic shift in
20 the -- in the extent of the riparian fencing as you
21 move from the small streams to the main stem river.
22 The main stem river, the places that I visited and
23 that I saw, was fairly well-fenced. There were lots
24 of places that cattle had access, but the cattle
25 access was not the norm on the main stem. That was

1 the norm as you moved to the smaller streams, and
2 that's rather typical.

3 Q. Okay. So that would also be a matter that
4 was foreseeable in terms of the transport of nutrients
5 in such a watershed, is it not?

6 MR. GEORGE: Objection, Your Honor. The
7 question's vague. Foreseeable as to whom? I'm not
8 sure --

9 MR. BULLOCK: Well, then let me
10 rephrase.

11 Q. (BY MR. BULLOCK) That phenomena of cattle
12 having access to streams and the transport of
13 nutrients through that is well-known, isn't it?

14 A. Well, the cattle access to streams is
15 definitely --

16 Q. Doctor, can you answer that question?

17 A. Well, you asked me two questions embedded in
18 one.

19 Q. Then I will break it down.

20 A. Okay.

21 Q. Okay. First part is, cattle play a transport
22 role of nutrients, particularly phosphorus, into
23 streams; correct?

24 A. That's correct.

25 Q. Okay. And that phenomena is well-known?

1 MR. GEORGE: Same objection, Your Honor.
2 Well-known as to who? It's still vague.

3 THE COURT: Overruled.

4 A. I think that within the community of people
5 that study water quality effects associated with
6 agriculture it's very well-known, but I think when you
7 move outside of that community maybe it's not very
8 well-known at all.

9 Q. (BY MR. BULLOCK) Okay. Is it your view that
10 cattle will stand in swiftly-running water?

11 A. It's my view that it depends on how deep the
12 water is. I think that my -- I'm not an expert on
13 cattle behavior, but I've observed a fair amount of it
14 in my work.

15 My view is that cattle will definitely avoid
16 deep, fast-flowing water, there's no question about
17 that. But the fact that it's fast-flowing and shallow
18 I'm not sure is necessarily much of an impediment.

19 Q. Of course, the question is the
20 characteristics of deep and shallow, and I think I'm
21 not going to get into that water.

22 As part of your work in this case, did you
23 undertake to quantify the amount of phosphorus
24 contributed to Lake Tenkiller by this transport of
25 cattle of what's been referred to as direct-deposit of

1 phosphorus into the streams? Did you ever make any
2 effort to quantify that?

3 A. I didn't make any effort to quantify the
4 transfer of anything into Lake Tenkiller.

5 Q. Okay. Let's talk some about your criticism
6 of the mass balance. And you used an analogy as
7 to -- or your criticism of the mass balance in terms
8 of using it as a tool to analyze sources was that if
9 someone brought phosphorus into this watershed and put
10 it in a warehouse, that while in that warehouse it
11 wouldn't be contributing to the phosphorus load in
12 these streams.

13 Am I paraphrasing your criticism?

14 A. Yes, that was one of my criticisms.

15 Q. Of course, you know that the phosphorus that
16 the poultry integrator defendants bring into this
17 watershed and which goes through their poultry is not
18 then locked in a warehouse, is it?

19 A. Not that I'm aware of.

20 Q. Okay. And, in fact, it's spread out onto the
21 thin, cherty soils of the Illinois River Watershed,
22 isn't it?

23 A. It's spread on the soils in which it's
24 allowed to be spread by the regulations where farmers
25 choose to spread it in accordance with those

1 regulations.

2 Q. But you wouldn't describe those soils as
3 constituting a warehouse, would you?

4 A. No.

5 Q. Okay. Let's talk about your other potential
6 sources -- or other sources.

7 Doctor, at the conclusion of your testimony,
8 I understood you to say that you had seen no data and
9 no study which supported the view that phosphorus from
10 poultry is getting into the waters of the Illinois
11 River. Do you recall that testimony?

12 A. I don't think I said "no study." If I
13 addressed study, it would have been no defensible
14 study.

15 Q. Okay. No defensible study. In fact, have
16 you not, read several government studies which
17 directly point to poultry as both a possible source
18 and as an actual source, have you not?

19 A. Well, I've certainly read reports that point
20 to poultry as a possible source.

21 Q. Okay.

22 A. I believe that there were reports that claim
23 that poultry was a source but didn't provide the data
24 to back up such a claim.

25 Q. Okay.

1 A. But I did not see any study that demonstrated
2 to me that the poultry litter contributed to
3 phosphorus in Lake Tenkiller.

4 MR. BULLOCK: If I might approach, Your
5 Honor?

6 THE COURT: Yes, sir.

7 *(Discussion held off the record)*

8 Q. *(BY MR. BULLOCK)* I have handed you what has
9 been marked as Defendants' Joint Exhibit 640. It's a
10 Comprehensive Basin Management Plan for the Illinois
11 River Basin in Oklahoma.

12 You recognize that, do you not, Doctor?

13 A. Yes, sir.

14 Q. In fact, you cite to that some 19 times in
15 your report as being a reliable source?

16 A. I didn't state whether it was a reliable
17 source or not, but I would agree with you that I've
18 cited it multiple times, yes.

19 Q. Okay. Let's go to page 86, down at the
20 bottom of the page, the last paragraph where it
21 says -- and I'll wait for folks to catch up -- "In the
22 past, much of the attention concerning nutrient
23 sources in the Illinois River Watershed has focused on
24 the poultry industry, and indeed this industry is a
25 significant primary source of many of the nutrients

1 available (in) the river and lake."

2 Do you see that?

3 MR. GEORGE: Objection Your Honor. I
4 think it was inadvertent, but it actually says
5 "available to the river," not "in the river."

6 MR. BULLOCK: I stand corrected.

7 Q. (BY MR. BULLOCK) Do you see that?

8 A. Yes, I do.

9 Q. Okay. And this comprehensive basin
10 management, in fact, was an extended and organized
11 study of the State of Oklahoma concerning particularly
12 nutrient and bacteria issues in this river; correct?

13 A. I would not agree with that characterization.

14 Q. Okay.

15 A. It is not a scientific study; it's a
16 management plan.

17 Q. Are you not also aware of the USGS
18 identifying poultry as a possible source -- as a
19 probable source and the phosphorus in the rivers of
20 the basin?

21 A. Well, I mean, when you say "USGS," that's a
22 federal agency.

23 Q. Yes.

24 A. I've seen a number of reports that were
25 written by USGS scientists. If you point me to the

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1 specific report, maybe I can respond a little bit more
2 clearly.

3 Q. Okay. Just to go back one more step in terms
4 of the basin management plan, in terms of your review
5 of potential sources of pollution in the IRW, isn't it
6 true that that basin management plan was at the top of
7 your list of sources?

8 A. That the plan was at the top of my list of
9 sources? I don't quite understand that question.

10 Q. Well, that it was at the top of your list of
11 information concerning possible sources in this
12 watershed.

13 A. I would agree with that.

14 Q. Okay.

15 A. For this particular watershed, this plan does
16 a good job of identifying potential sources.

17 Q. Okay.

18 *(Discussion held off the record)*

19 MR. BULLOCK: If I might approach this
20 time, and I'll try not to make -- I think I'm going to
21 leave it dry here for a few minutes. When you get
22 burned --

23 THE WITNESS: Thank you, sir.

24 Q. *(BY MR. BULLOCK)* Doctor, I've handed you
25 what is -- and I believe this is admitted, but for

1 these purposes we don't need to determine
2 that -- Exhibit 5862, Oklahoma Exhibit. It is a USGS
3 report entitled, "Phosphorus concentrations loads and
4 yields in the Illinois River Basin, Arkansas and
5 Oklahoma, 2002-2004."

6 Do you recognize that?

7 A. Yes, sir.

8 Q. Okay. And that's one of the sources that you
9 consulted in this matter?

10 A. I have looked at this, yes.

11 Q. Okay. Let's go to page 4.

12 A. Yes, sir.

13 Q. Okay.

14 *(Discussion held off the record)*

15 Q. *(BY MR. BULLOCK)* Down at the bottom of the
16 first column there, about the final paragraph, about
17 the fourth line, the middle of the line --

18 A. Okay. Just a minute, sir.

19 Q. Okay.

20 A. So we're on page 4 and the first -- the
21 first column?

22 Q. First paragraph?

23 A. First paragraph that starts "phosphorus" --

24 Q. I mean -- I'm sorry. First column.

25 A. Okay.

1 Q. Last paragraph.

2 A. Okay.

3 Q. Fourth line down.

4 A. Okay.

5 Q. Middle of that line.

6 A. Where it says, "such as runoff"?

7 Q. No. Where it says, "phosphorus
8 concentrations" --

9 A. Okay. Gotcha.

10 Q. -- "in Ozark streams are typically greater in
11 streams draining agricultural lands than in those
12 draining forested lands."

13 You would agree with that; correct?

14 A. Yes, I would.

15 Q. And that's consistent with your testimony?

16 A. It is.

17 Q. "Because runoff from pastures fertilized with
18 animal manure are probable substantial sources of
19 phosphorus for the rivers in this basin."

20 Do you see that?

21 A. I do.

22 Q. Okay. And do you disagree with that?

23 A. Yes, I do.

24 Q. Okay. Are you also --

25 A. That's not a conclusion of the study; it's an

1 assumption.

2 Q. Okay. Are you also aware of any reports from
3 the State of Arkansas regarding the same subject
4 matter?

5 A. I have seen other studies besides this that
6 would state that poultry litter or the use of animal
7 manure would be a probable source of nutrients to the
8 streams, but none of those were studies that
9 documented that. People assumed that -- people have
10 assumed that for years, but that doesn't mean that
11 it's a correct assumption.

12 It's necessary to collect the data and
13 determine if that assumption is correct or not, and
14 the studies that I've seen in this watershed that
15 address this are not studies that quantified that
16 issue at all.

17 Q. Okay. Then all of those studies would, in
18 your view, be in error?

19 A. No. Many of those studies are probably good
20 studies. We're not talking about a conclusion of a
21 study here; we're talking about an assumption. In
22 this case, it's in the study area description. It's
23 just -- it's just an initial premise or an assumption
24 that the authors made. The study was not intended to
25 address it at all.

1 Q. Okay. Then let me ask you the inverse.

2 Have you seen any study which comes to the
3 conclusion that poultry is not a substantial source of
4 the phosphorus in the streams of the IRW?

5 A. I've not seen a study that was designed to
6 look at that question. So the answer is no.

7 Q. Okay. And you didn't conduct such a study?

8 A. I did not conduct a field study in the IRW.

9 Q. Okay. Did you look for any study which
10 supported that proposition?

11 A. I looked for whatever studies I could find
12 and I ended up looking at quite a few studies. I was
13 certainly not trying to include or exclude any study
14 based on its intent or what it was pointed towards,
15 no.

16 Q. Well, let's get on to the sources that are
17 potential sources, possible sources, that you do
18 discuss.

19 One of the sources is wastewater-treatment
20 plants; correct?

21 A. That's correct.

22 Q. That's a source because we can see the pipe
23 coming out of the ground and we know that it flows
24 into the stream and the stream connects on down to the
25 lake?

1 A. Precisely.

2 Q. Okay. Now, you are aware, though, that
3 studies directed at that have determined that only 90
4 to 83 percent of the phosphorus load going into
5 Tenkiller comes from point sources, are you not?

6 A. I'm aware of studies that such percentages of
7 the flow into Lake Tenkiller occurred under high-flow
8 conditions. But I don't think that characterizing it
9 as point source -- I'm not sure -- the point source is
10 a moving target, it's been changing quite a lot over
11 the last 10 years. Ten or fifteen years ago it --

12 Q. Oh, I'm sorry. I'm sorry. Counsel just
13 pulled my chain and rightfully so.

14 Actually, it's 90 to 83 percent come from
15 nonpoint sources of the loading to the lake,
16 phosphorus loading; isn't that correct?

17 MR. MCDANIEL: Excuse me, Your Honor.
18 There's no foundation for Mr. Bullock's question. It
19 assumes facts not in evidence.

20 THE COURT: Sustained.

21 Q. (BY MR. BULLOCK) Okay. Doctor, the loading
22 from the point sources in this watershed is a very
23 small percentage, is it not?

24 A. The loading from the point sources has been
25 changing dramatically. There was an estimated 40

1 percent reduction in the point-source phosphorus, as I
2 remember, from Dr. Jarman's analysis. So it depends
3 on what period of time you want to look at.

4 Q. Okay. Let's look at the 2000 to 2004 period.

5 A. Okay. It would certainly be -- I'm sorry.
6 Was the question the percent of point or nonpoint?

7 Q. Those are sort of inverse numbers, are they
8 not?

9 A. Yes, they are.

10 Q. Okay. Let's go on nonpoint.

11 A. Okay. That's not something that I quantified
12 for my -- for my report but I have -- I've seen such
13 estimates. The percent of nonpoint is certainly well
14 over half, but I can't tell you exactly what the
15 amount is. I mean, I can respond to a particular
16 study, if you want to show it to me.

17 Q. Okay. Did you look at this
18 exhibit -- this -- what is Exhibit 5862, the USGS
19 study, did you look at that in terms of this issue?

20 A. Well, I certainly did. But as I said, it's
21 not an issue that I -- that I addressed in my report
22 in terms of quantifying point versus nonpoint. So I
23 would have to go back to the -- to the report and try
24 to find where the report might provide such
25 information. If you can point it to me, then maybe I

1 can respond.

2 Q. Okay.

3 MR. GEORGE: Your Honor, I'd like to
4 interpose an objection here to this line of
5 questioning given that the witness has not quantified
6 point versus nonpoint. I'm not sure what we're
7 impeaching and it's beyond the scope of direct.

8 THE COURT: Response?

9 MR. BULLOCK: I'll lay some further
10 foundation.

11 Q. (BY MR. BULLOCK) Doctor, are you suggesting
12 that point sources can account for the nutrient loads
13 in the Illinois River?

14 A. That they can account for all the nutrient
15 loads in the IRW? No.

16 Q. Okay. How about a substantial part of
17 those?

18 A. That point sources can account for a
19 substantial part of the loads? They certainly can.
20 And it's going to depend on where in the river and
21 under what conditions, but yes, they can.

22 Q. And so when you -- when you -- let's talk
23 about the annual loads. Point sources account for a
24 substantial part of the annual loads going into the
25 lake?

1 A. Well, again, I didn't really focus on going
2 into the lake. I focused on the Illinois River --

3 Q. Well.

4 A. -- and its tributary systems. John Connolly
5 focused on going into the lake.

6 Q. Doctor, in your direct testimony, you were
7 testifying concerning the lacustrine portion of the
8 lake and the health of it.

9 A. The water quality, yes; not the loading of
10 phosphorus, no.

11 Q. Yes. Okay. Beyond the -- do you agree with
12 me that you cannot account for within the river system
13 the phosphorus loads by merely looking at point
14 sources?

15 A. Point sources are not the only component
16 providing phosphorus, no.

17 Q. All right. Did you evaluate any of the other
18 potential nonpoint sources as to what their
19 contribution might be to the streams?

20 A. In terms of quantifying the contribution?

21 Q. Yes.

22 A. I didn't quantify the contribution of any
23 nonpoint sources, no. I didn't have the data to do
24 that.

25 Q. You could have asked to get the data, could

1 you not?

2 A. I'm not sure who I would have asked. The
3 plaintiff's experts did not collect the data to allow
4 me to quantify any nonpoint source.

5 Q. You didn't ask your clients to allow you to
6 do that, did you?

7 A. We discussed the possibility early on in my
8 involvement in this case, yes, we did.

9 Q. Okay. And who decided that that would not be
10 done?

11 A. I don't know what the final decision was. It
12 was not my recommendation that that would be done, but
13 I put it out there as an option to be considered.

14 Q. Okay. And that option wasn't accepted, was
15 it?

16 A. It wasn't suggested to be accepted. It was
17 something that we discussed as a possibility.

18 Q. Okay. Well, as I understand your testimony;
19 that is, as to other potential sources which you have
20 mentioned here, your criticism of the plaintiffs is
21 that they did not consider those sources; is that
22 correct?

23 A. My criticism is that -- is that the state
24 knew what the major potential sources were because
25 they were well covered already in the basin management

1 plan, but yet they did not design a sampling program
2 for the IRW that would allow evaluation of the
3 relative importance of those various potential
4 nonpoint sources. So that was my major criticism
5 there.

6 Q. Okay. So you are aware that the plaintiffs
7 did consider the relative importance of a variety of
8 potential sources; is that not correct?

9 A. Oh, I completely disagree with that.

10 Q. Okay.

11 A. The considerations that were made were
12 woefully inadequate and the data were never collected
13 to allow it in the first place.

14 Q. Well, your testimony is that while it may
15 have been considered, that you disagree as to the
16 extent that it was considered?

17 A. When I look at how the samples were collected
18 and the basis under which they were --

19 Q. Doctor, I need you to answer my question,
20 please.

21 A. Okay. I'm sorry. Please repeat the
22 question.

23 Q. Okay. Your criticism is not that the
24 plaintiffs didn't consider these matters, but it goes
25 to the extent to which these other potential sources

1 were considered?

2 A. I'm not sure I would agree with that.
3 Because when I say -- use the word "consider," I
4 mean -- I mean to be serious about it, not to just
5 write it off without basis. So I just disagree with
6 the characterization of "consider," but you can
7 interpret that either way.

8 Q. Well, let's look at urban runoff. As to the
9 consideration of the role that urban runoff plays, you
10 saw the transcript of the testimony that Dr. Engel
11 gave to this court concerning the way that he
12 evaluated the potential impact of urban runoff, were
13 you not -- did you not?

14 A. I looked at some of the Engel transcript.
15 I'm not sure that I recollect him explaining what he
16 did about urban, but he certainly didn't collect
17 samples above and below urban areas.

18 Q. So this is purely a matter that they didn't
19 collect samples above and below, it is not a matter of
20 whether or not they had or expressed a basis on which
21 to consider or dismiss various potential sources;
22 correct?

23 A. Well, I didn't see an analysis in the Engel
24 report certainly that would allow him to dismiss the
25 importance of urban sources. If there's something he

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1 said in this courtroom, then I guess I need to be
2 reminded of what he said. I'm not sure that I read
3 all of the Engel trial testimony or not.

4 Q. Okay. And so to the extent that he testified
5 as to the basis on which he evaluated the impact of
6 urban runoff, you have no basis today to disagree with
7 that?

8 A. Well, I do. Because I know that he didn't
9 have the data to make that evaluation so I would
10 definitely disagree with it. I don't know where he
11 would have gotten the data from. He didn't collect it
12 in this study.

13 Q. Other than the issue of whether he had any
14 data to do that, you're unaware of how else he might
15 have evaluated the potential impact of urban runoff?

16 A. I'm not aware of how else he might have
17 evaluated that without any data.

18 Q. All right. You also understand, do you not,
19 that this case is not a watershed study as to how to
20 clean up all of the various potential sources for this
21 watershed; correct?

22 A. I would agree with that.

23 Q. Okay. That it does focus upon the issue of
24 whether or not phosphorus from poultry specifically is
25 having some substantial impact on the water quality in

1 this watershed; right?

2 A. I agree that that's the question at hand,
3 yes.

4 Q. Okay. But if you were looking at the
5 quantification -- or correction of the issues of urban
6 runoff, then you'd need a study that was directed at
7 urban runoff; correct?

8 A. If you wanted to quantify urban runoff, you
9 would need a study that included an evaluation of
10 urban runoff, yes.

11 Q. Okay. And as you say, the plaintiffs didn't
12 do that, did they?

13 A. No, they did not.

14 Q. Let's talk about your septic tanks.

15 You say that they are a possible source of
16 contamination; correct?

17 A. That's right.

18 Q. And that suggests that you are confident that
19 they could have a sufficient magnitude of influence on
20 this watershed that they need to be investigated;
21 correct?

22 A. I would expect the magnitude of influence to
23 be quite variable in different parts of the watershed.

24 Q. Well --

25 A. I think that -- that it's a topic that should

1 have been investigated.

2 Q. But what you gave were the total numbers of
3 people that are not on septic tanks; is that true?

4 A. An estimate of that.

5 Q. An estimate of that. Suggesting that due to
6 the estimate of that, that the combination of all of
7 those suggests a potential impact on the water quality
8 of this watershed; right?

9 A. I think that's -- that's part of it, but
10 there are other issues that also suggest that you
11 would -- that you should consider septic. But
12 certainly the number -- the sheer number of people on
13 septic systems is part of that equation, yes.

14 Q. And I'm looking at -- it's behind tab 19 and
15 it's your Exhibit 2279.

16 A. Yes, sir.

17 Q. Okay. And that shows 76,598 estimated people
18 on septic systems?

19 A. Yes.

20 Q. Okay. And you've testified that you're not
21 aware of the percent to which these are -- the percent
22 of the septic systems that are not functioning at all
23 or the percent that might be functioning some but
24 still not adequately, are you?

25 A. I'm aware of a couple of studies to address

1 that very issue in the IRW.

2 Q. Okay.

3 A. Yes. And that's actually an issue that was
4 addressed in the Haraughty management report that
5 we've been talking about. For the Oklahoma side of
6 the IRW, the study that she discussed indicated that a
7 rather high percentage were not functioning properly
8 or were poorly sited.

9 Q. Okay. But one of the questions here in terms
10 of the watershed generally is the amount of phosphorus
11 that could potentially be contributed by this some
12 76,000 people; correct?

13 A. The amount of phosphorus that could be
14 contributed? Well, I suppose that's one of the things
15 that's involved but it's certainly not the only one.

16 Q. Well, are you not aware that the study
17 that -- that you credit, the basin management study,
18 actually says that a person is the equivalent of,
19 like, 3.7 chickens in terms of phosphorus
20 contribution?

21 A. Well, that's not something that I remember.
22 But if you're talking about phosphorus contribution to
23 a stream or a septic effluent, then no, that's not
24 true because chickens don't use restroom facilities
25 and bathrooms.

1 Q. But when we're talking about phosphorus
2 contribution from septic tanks, that's a relevant
3 comparison, is it not?

4 A. No, it's not. Because the septic tanks are
5 placing their effluent at certain locations, and the
6 poultry litter is placed in other locations and
7 they're completely different locations and different
8 opportunities for transport. So it's not similar at
9 all.

10 Q. Well, isn't it true, though, that the total
11 amount of phosphorus contributed by poultry -- I mean,
12 by septic tanks is actually -- or even that could be
13 contributed by septic tanks is inconsequential in
14 terms of the dynamics in this watershed?

15 A. I certainly wouldn't conclude that. But I'm
16 not arguing the fact that if someone conducted an
17 appropriate study, that that's a possibility that they
18 might conclude that. I really don't know. There are
19 a lot of septic systems and evidence indicates a lot
20 of them don't function properly. It's something that
21 should have been evaluated to determine if it was
22 significant or not.

23 Q. Okay. Doctor, you have in front of you
24 the basin management plan. If you'd go to page 88 and
25 confirm that, in fact, it shows the equivalent of 3.7

1 chickens to each person.

2 A. Okay. I have page 88.

3 Q. Okay. Let me find mine. Okay. And if
4 you'll go to what is the third paragraph, second
5 sentence, "This means that while one person equals 23
6 broilers in terms of the pounds of waste excreted,
7 they equal 11 broilers in terms of nitrogen excreted,
8 and only 3.7 broilers in terms of phosphorus
9 excreted."

10 Do you see that?

11 A. I see that, yes.

12 Q. Okay. Let's do a little calculation then to
13 get some idea of relative risk here.

14 MR. GEORGE: Your Honor, I apologize.
15 Before Mr. Bullock asks his question, I want to object
16 to this line of questioning. I'm not sure what it is
17 impeaching. We did not through Dr. Sullivan offer any
18 human equivalency analysis and I sense that's where
19 we're headed.

20 THE COURT: I think he's impeaching this
21 idea with regard to relative contributions and other
22 potential sources and whether or not septic tanks are
23 a serious and consequential potential source.
24 Correct?

25 MR. BULLOCK: Correct.

1 MR. GEORGE: Your Honor, the only point
2 I would make is that Dr. Sullivan has not offered
3 relative contribution opinions, and so I want to be
4 careful that we don't head into an area that this
5 witness was not proffered on direct.

6 THE COURT: Well, to the extent that he
7 did opine, as I recall, that this is an area that
8 should have been looked into, I think this impeaches
9 that. The objection's overruled.

10 Go ahead.

11 MR. BULLOCK: Okay.

12 Q. (BY MR. BULLOCK) So let's take that to your
13 76,000 figure, and, in fact, just for some ease of
14 calculations, let's take the number of people on
15 septic to 80,000, round it up, okay?

16 A. Okay.

17 Q. And then I'm going to take the 3.7 and round
18 it up so that it takes four full broilers to equal one
19 of those people, okay?

20 A. Okay.

21 Q. Easy math, we get 320,000 chickens at that
22 point, poultry broilers.

23 A. That would be correct.

24 Q. Okay. And testimony in this court is that
25 that would -- 20,000 per broiler house, we're only

1 talking about 16 broiler houses worth of phosphorus
2 here, aren't we?

3 A. I wouldn't disagree with that.

4 Q. Okay. And you're aware that there's
5 approximately 1,800 broiler houses in this watershed,
6 are you not?

7 A. I would say the number's probably not too
8 different than that.

9 Q. Okay. And so do you still contend
10 that -- and by the way, that calculation would presume
11 that all of the phosphorus from all of these people
12 that are on septic systems bypasses the septic systems
13 and goes directly into the stream, wouldn't it?

14 A. Yes, it would.

15 Q. Okay. And so you still contend that that is
16 a potential source that was necessary for the
17 plaintiffs to -- for the plaintiff to investigate in
18 order to determine that poultry is a significant
19 source of the phosphorus in the rivers?

20 A. Yes. And I can explain why.

21 Q. Okay. Well, you can do that on cross. Let's
22 go to the sewage bypass.

23 Isn't it true that the total point-source
24 contribution to the lake is less than 20 percent?

25 A. Today, I think that's probably correct. It's

1 in that range somewhere.

2 Q. And it has been in that range even prior to
3 the sewage upgrades, wasn't it?

4 A. I saw estimates that were closer to double
5 that from ten to fifteen years ago.

6 Q. Okay.

7 A. And also estimates that the amount has
8 decreased by 40 percent over roughly a ten-year
9 period. So it's been changing quite dramatically in
10 recent years.

11 Q. Well, let's go to the less than 20 percent of
12 the point sources.

13 In light of that -- now, the sewage bypasses,
14 are those occasion, as you say, when you have a broken
15 sewer line, you have a backed up sewage system, and
16 you have some fault with the plan itself; correct?

17 A. Those would be examples of that, yes.

18 Q. Okay. Most days the system works pretty
19 well, doesn't it?

20 A. Typically.

21 Q. Okay. So is it still your testimony that in
22 light of the loading that's coming from the point
23 sources themselves, that it was necessary for the
24 plaintiffs to evaluate -- do a detailed evaluation of
25 the sewage bypass in order to determine whether

1 poultry is having some substantial impact upon the
2 waters of the IRW?

3 A. I think it's important to consider all of the
4 potential sources, even the ones that are probably
5 relatively small. I wouldn't say you need a
6 comprehensive investigation. But in some of these
7 sub-basins, we're looking at areas that are relatively
8 small streams and diffuse nonpoint sources of many,
9 many kinds.

10 The plaintiffs evaluated water quality
11 throughout the entire watershed, including a lot of
12 these smaller tributaries. The proportion of septic
13 effluent or accidental discharges or anything relative
14 to the total in the watershed is not relevant to
15 evaluating what's going on in some of the
16 smaller -- some of the smaller watersheds. So the
17 plaintiffs and I looked at spatial patterns as an
18 important tool of evaluating what's going on.

19 Q. Doctor, I just asked you whether or not in
20 light of the percentage, it was still necessary in
21 your view for the plaintiff to evaluate sewage bypass
22 in order to determine whether poultry waste was a
23 substantial contributor to the water quality issues in
24 the IRW. And is that "yes" or "no"?

25 A. It's -- they should have considered it

1 because of the way that they were able to go about
2 evaluating the role of poultry as looking at the
3 smaller sub-basins. They should have considered it.

4 Q. Okay. Now, in fact, are you not aware that
5 in terms of the smaller sub-basins, that Dr. Engel did
6 a calculation similar to what we did with the 16, a
7 total of 16 poultry houses throughout the entire
8 watershed, that he did that type of an evaluation and
9 determined that the possible contribution from septic
10 was de minimis in those watersheds -- those
11 subwatersheds?

12 A. Yes. Based on the septic, but he got an
13 opposite result based on the urban areas.

14 Q. Okay. Let's talk about dirt roads.

15 Are you not also aware that Dr. Engel
16 evaluated the significance of the issue of dirt roads
17 in reaching his opinions?

18 A. I don't remember seeing any erosion
19 calculations by Dr. Engel.

20 Q. I didn't ask you whether there were any
21 erosion calculations. I asked you whether Dr. Engel
22 made an evaluation as to the significance of
23 contributions from dirt roads in coming to his opinion
24 in this matter?

25 A. I don't remember seeing a study by Dr. Engel

1 to do that, no.

2 Q. Okay. Let's talk about the issue -- one of
3 the -- of course, a dirt road in the ordinary course
4 of things would have just a background level of
5 phosphorus in it; correct?

6 A. Are you talking about in the road surface
7 itself?

8 Q. Yes.

9 A. Well, they would have whatever phosphorus
10 level was in it based on the materials used to
11 construct that road.

12 Q. Okay. Is that a -- did they enhance the
13 phosphorus level in dirt roads when they -- they cut
14 them and construct them?

15 A. Not that I'm aware of.

16 Q. Okay. But you also mentioned the issue of
17 dust as one of the potential sources on those dirt
18 roads for enhancement of phosphorus levels.

19 A. That's a possibility.

20 Q. Okay. And in this watershed, wouldn't one of
21 the sources of that -- of a high-phosphorus dust that
22 you would be concerned about be from the dust from the
23 spreader trucks spreading the poultry waste?

24 MR. GEORGE: Objection, Your Honor;
25 assumes facts not in evidence. I don't think there's

1 anything in the record about poultry dust.

2 THE COURT: The record doesn't have
3 anything relative to the source of the dust that
4 Dr. Sullivan testified about but he testified that it
5 was a possibility. Overruled.

6 Go ahead.

7 Q. (BY MR. BULLOCK) Okay.

8 A. I'm sorry. Can you repeat the question?

9 Q. Well, let's go about it this way.

10 Have you ever seen either personally or
11 pictures of spreader trucks spreading waste?

12 A. I've seen pictures of spreader trucks, yes.

13 Q. Spreading waste?

14 A. And I've seen fields on which the poultry
15 litter had been applied.

16 Q. The truck spreading the waste?

17 A. I believe I have, yes.

18 Q. Okay. And the large plume of dust which
19 comes from that process?

20 A. I'm not sure I would characterize it as a
21 large plume, but I have seen photographs, I'm sure,
22 that show spreader trucks and some dust behind those
23 trucks. I'm sure I've seen that.

24 Q. Okay. And in terms of phosphorus enhancement
25 of the roads by dust, that would be a potential source

1 for the phosphorus enhancement; right?

2 A. It would depend on where the water went off
3 the road through the ditches and interactions with
4 culverts and streams and that sort of thing. But it
5 is a potential source that -- that could easily or
6 should have perhaps been evaluated in the -- in the
7 sampling effort.

8 Q. And you'd also have on those dirt roads any
9 poultry waste that might have accidentally been spread
10 being moved from site to site; right?

11 A. I have no idea if that sort of thing happens
12 or not.

13 Q. Is that a potential?

14 A. I certainly can't say it's not a potential; I
15 simply don't know. I've not observed the trucks
16 carrying poultry litter to fields and what the
17 possibility would be that some of that poultry litter
18 would fall off the trucks. That's not something I've
19 observed.

20 Q. One other thing in terms of -- that I want to
21 clarify -- or a couple of things in terms of
22 Dr. Engel's poultry house density study.

23 You also did a correlation with
24 the -- the -- let me gather my thoughts here.

25 In terms of your cross-correlations, we've

1 talked about the issue of the septic systems. In
2 terms of the cattle that you gave, the exhibit, as we
3 pointed out, dealt with Dr. Clay's calculation, but I
4 take it that you're competent to testify concerning
5 how that calculation was done?

6 A. Dr. Clay took the cattle numbers from the ag
7 census and he simply aggregated them. I presented
8 data where I aggregated the cattle numbers by county
9 from the same survey. It was just a simple
10 aggregation of the data by zip code.

11 Q. But zip codes in rural areas are much larger
12 than what the subwatersheds were, aren't they?

13 A. Yes, they are. That's why I did the
14 correlation over a larger land area than simply the
15 subwatersheds.

16 Q. Okay. So your correlations that you're
17 offering us were not merely over the subwatersheds,
18 but over some extended area?

19 A. That's correct.

20 Q. Okay. And so Dr. Engel has one study and you
21 have another study?

22 A. Correct.

23 Q. Okay. And how -- so that I'm -- I'm clear,
24 how did you define the area of your study?

25 A. Well, it was the -- it was the zip codes that

1 were -- I can go back to the figure and clarify this a
2 hundred percent. Perhaps I should do that to make
3 sure I don't say something --

4 Q. Well, just describe to me, how did you define
5 your area that you did your study on?

6 A. We included the zip codes that were more than
7 half inside the IRW is my recollection --

8 Q. Now --

9 A. -- and larger than a certain size. Some zip
10 codes are merely post office boxes so we didn't --
11 those don't have any area. So it was above a size
12 cutoff.

13 Q. Doctor, I'm not trying to cut you off on this
14 one, but I want to be sure we're communicating here
15 because I'm talking about the poultry house density
16 correlations, okay?

17 A. Correct.

18 Q. So you didn't use the subwatersheds, you used
19 zip codes?

20 A. Okay. I used the subwatersheds for roads and
21 septic, and I used -- did not use the subwatersheds
22 for cattle because that was not possible for me to do.
23 So I did -- I used the zip codes for cattle.

24 Q. Okay. And how did you determine your house
25 count?

1 A. We used the plaintiff's database on poultry
2 house counts and their locations, and we did the
3 analysis based on the locations of those.

4 Q. Okay. Now, in your analysis, did you include
5 a buffer or not?

6 A. Not.

7 Q. Okay. And so your study in terms was much
8 larger than a study of the subwatersheds, wasn't it?

9 A. For the cattle relationship, it was; for the
10 other two relationships, it was the same.

11 Q. Okay. Let's talk about the edge-of-field,
12 which you say is not -- or I guess you said you don't
13 know what it is representative of; is that correct?

14 A. No one knows what it's representative of,
15 sir.

16 Q. Okay. Do you have any -- first of all, you
17 do understand that poultry waste is high in terms of
18 copper, zinc, and arsenic; correct?

19 A. That's not something I evaluated. I can give
20 you my opinion, if you want.

21 Q. Okay. Well, if you didn't evaluate it --

22 A. I didn't evaluate it.

23 Q. And you didn't evaluate the level of copper
24 zinc and arsenic in cattle waste, did you?

25 A. No.

1 Q. And so when in the edge-of-fields, the
2 analysis focused on not only phosphorus, but also the
3 copper, zinc, arsenic, and I believe the -- what
4 was --

5 *(Discussion held off the record)*

6 Q. *(BY MR. BULLOCK)* Or there was organic
7 material and I think we also had some other element.
8 It's blocking me at the moment.

9 But you didn't evaluate it as to those
10 issues, did you?

11 A. Another expert for the defense dealt with
12 that. I did not deal with that.

13 Q. Okay. But your testimony doesn't go to that
14 at all?

15 A. No, sir.

16 Q. Let's do the -- let's talk next just briefly
17 concerning your geomean calculations. As you've said,
18 those were not intended to compare -- or let me
19 rephrase.

20 In terms of the geomeans that you calculated,
21 you used anyplace where you could find five, in this
22 case, phosphorus concentrations over a seven-year
23 period; correct?

24 A. There were some analyses that I did that were
25 based on that, that's correct.

1 Q. Okay. And in doing the geomean in that
2 manner, does the fact that there may have been five
3 samples taken at any particular time over a seven-year
4 period, does that truly tell you anything about the
5 water quality of any particular place?

6 A. Yes. It can give you a general indication of
7 what that water quality is.

8 Q. Well, there may have been all sorts of
9 reasons for the particular sampling over a seven-year
10 period where it's so spread out; correct?

11 A. That's -- that's correct. But there
12 are -- that's one of the reasons why you use multiple
13 sites when you're looking for spatial patterns.

14 But the other issues is there are lots of
15 surveys, I mean, including the EPA surveys, where the
16 characterization is based on one sample only. So
17 having seven samples or ten samples or whatever is not
18 really a particular large issue in my view.

19 Q. And, of course, that also raises the whole
20 issue of using the means that -- because of the spread
21 of your data, the time spread of the data, the mean
22 similarly could be meaningless given that it could be
23 one particular event versus several inconsequential
24 event, right, and the mean would be overly influenced
25 by this one event when the phosphorus level spiked?

1 A. No, I wouldn't agree with that. I think that
2 in sites where you have more data points, then that's
3 a good thing; the more data you have the better. And
4 that's really why I extended it out over a seven-year
5 period rather than restricting it.

6 But the fact that you have relatively few
7 data points is not an obstacle to doing a spatial
8 analysis. It's done that way all the time. I've
9 published lots of papers on it that way. All the EPA
10 studies, like I said, are -- the surveys, the lake
11 surveys, stream surveys are conducted that way based
12 on one sample. It's not unusual.

13 Q. Are you suggesting to this court that a
14 handful of water samples taken over a seven-year
15 period provides a comparable basis for comparing the
16 phosphorus levels in the IRW collected using the
17 Scenic River's standard?

18 A. What I'm suggesting is is that having a
19 relatively few number of samples is not an impediment
20 to examining spatial patterns. But when you do that,
21 you have to be cognizant of the fact that at some of
22 those sites you have few samples, and therefore, you
23 don't put undue influence on any one sample and draw a
24 conclusion based on the response of one site or two
25 sites or three sites and so on. You would not draw a

1 conclusion based on that for the very reasons that
2 you're discussing.

3 But your overall spatial pattern is a robust
4 way of looking at large data sets and something that's
5 done all the time.

6 Q. And particularly as to doing that in
7 Oklahoma, you recognize that in addition to that
8 issue, you are also comparing remarkably different
9 waterbodies at the same time; right?

10 A. Well, I'm not sure what you mean by
11 "remarkably different." But, I mean, we're looking at
12 all of the streams for which there's adequate data
13 available to see what the patterns are to examine two
14 things. One is, are the high phosphorus values
15 associated with locations where people raise a lot of
16 poultry; and the second is, to answer the question,
17 are the phosphorus values in the IRW somehow
18 dramatically different from elsewhere in the state?

19 The spatial patterns give us a very robust
20 tool to evaluate both of those questions.

21 Q. Okay. Well, let's first work on the one that
22 I raised, and that is the issue of remarkably
23 different waterbodies. You answered some of that with
24 the judge, that -- I just want to be sure that you
25 understand the geographic changes in this state, how

1 remarkably different it is from east to west.

2 A. I would agree that there are -- there are
3 definite differences in the streams. But the question
4 is the extent to which those differences might
5 influence the interpretation of phosphorus data.

6 My point is, that that's not likely to be an
7 important issue because the background phosphorus
8 concentrations are believed to be relatively
9 homogeneous throughout the entire country, not a huge
10 difference in what you expect to see in terms of
11 background phosphorus.

12 So whatever you see on top of that is
13 anthropogenic, it's what people have caused, and the
14 fact that your streams are different doesn't really
15 influence that at all.

16 Q. Okay. Well, let's go to the issue that
17 you're -- are you suggesting that your analysis
18 negates poultry as a source of high phosphorus levels
19 in the streams of the IRW?

20 A. What I'm saying is, is that nobody collected
21 the data to allow me or anybody else to evaluate that.
22 So --

23 Q. No. Doctor --

24 A. So I'm not saying that, no.

25 Q. Okay. You're not saying that this analysis

1 is proof of a lack of causation, are you?

2 A. I'm not saying that my analysis is proof of a
3 lack of causation, no.

4 Q. Okay. Because, in fact, an analysis of
5 whether any particular source is having an impact in a
6 particular watershed does require investigation within
7 that watershed; correct?

8 A. I'm sorry. I think so. Can you please
9 repeat it? I apologize.

10 Q. Okay. It is true that determining whether a
11 particular source has an impact in a particular
12 watershed requires a site-specific investigation;
13 right?

14 A. That's correct.

15 Q. Okay. And so if we go out to western
16 Oklahoma and we find high phosphorus levels and we go
17 to the IRW and we find high phosphorus levels in
18 poultry, you wouldn't suggest that the western
19 Oklahoma water quality issues are determined
20 because -- on that basis that they have poultry;
21 right?

22 A. You can't take the phosphorus concentration
23 in two streams and from looking at those tell what the
24 different sources might be in either stream, no.
25 That's not possible.

1 Q. Okay. And the fact that a western Oklahoma
2 stream might be influenced -- have high phosphorus
3 levels as a result of a cattle feed lot or a dairy
4 concentration doesn't tell you that the IRW could not
5 have elevated phosphorus levels due to a concentration
6 of poultry, could it?

7 A. That simple comparison would not give you
8 that information, no.

9 Q. Okay.

10 MR. BULLOCK: Judge, would this be a
11 good time to take a break, and then I think I can --

12 THE COURT: If it is for you.

13 MR. BULLOCK: Thank you.

14 THE COURT: Let's take a break.

15 *(Short break)*

16 THE COURT: Mr. Bullock, what's the
17 prognosis here of being able to --

18 MR. BULLOCK: I think we're going to
19 succeed.

20 THE COURT: All right.

21 Q. *(BY MR. BULLOCK)* Let's just do a couple of
22 things here to clean up.

23 Okay. Doctor, let's go to tab -- it's tab
24 11. It's actually Defendants' Joint Exhibit 1454,
25 which was the aerial of the Watts lagoon.

1 A. Yes, sir.

2 Q. Which, as you say, was not -- this particular
3 picture wasn't in your materials but you did talk
4 about this issue?

5 A. Yes, I did.

6 Q. Okay. Now, to some extent, the significance
7 of this as a relative source would depend on the same
8 type of analysis that you and I went through with
9 the septic tanks; right?

10 A. Well, I think in some ways, it would be -- it
11 would be related. In this case, the effluent is
12 actually sprayed on the surface of the ground or as
13 the septic tanks are -- the effluent is distributed
14 underground so there would be some differences.

15 Q. Okay. But we posited that the septic tanks
16 would deliver it straight to the river and got the 16
17 houses for seventy or eighty thousand people; right?

18 A. Yes, I recall that.

19 Q. And there are distinctions and I'm not trying
20 to overlook those. But do you have any estimate as to
21 the number of people served by this Watts lagoon
22 system?

23 A. I don't remember the population of Watts, but
24 I do believe it's in my report in a table that --
25 actually that table might be in here so I can search

1 for it, if you'd like. I'm sure I have that
2 information but I don't recall what the number is.

3 Q. Well, why don't you -- if you can do that
4 quickly. As you can tell, the court is going to hold
5 me to my promise to get you off the stand.

6 A. If one of your assistants finds it before I
7 do, then he can just shout it out.

8 THE COURT: Unless, of course, Doctor,
9 you want to stay in Tulsa another day.

10 THE WITNESS: No, thank you, sir.

11 MR. GEORGE: Dr. Sullivan and
12 Mr. Bullock, tab 19, I think, is probably what you're
13 looking for.

14 MR. BULLOCK: Thank you. But that
15 doesn't tell you the number of people. That's what I
16 was wondering about.

17 Q. (BY MR. BULLOCK) Does that show -- 19 show
18 the Watts -- oh.

19 MR. GEORGE: I believe it does.

20 A. The 316.

21 Q. (BY MR. BULLOCK) So it was included in that,
22 in terms of septic, but --

23 A. No. That would -- well, let me see.
24 Watts --

25 Q. Oh, that's with the centralized so that would

1 be right. That's 316.

2 MR. BULLOCK: Thank you, Robert.

3 A. Yes, yes.

4 Q. (BY MR. BULLOCK) And so in terms of the
5 relative -- and we don't have to go through it -- but
6 the relative risk of this, you would look at that type
7 of an issue in part; correct?

8 A. I would look at it in part, yes.

9 Q. Okay. And then you also stated that there
10 was a hundred-foot setback from this spray field from
11 the river. Do you recall that testimony?

12 A. It's somewhere in that range, yes.

13 Q. Okay. And you understand that that is the
14 Oklahoma setback under the Oklahoma BMPs?

15 A. That's correct.

16 Q. Okay. And are you not also aware that
17 Arkansas on a two percent slope has this as small as a
18 20-foot setback?

19 A. Yes, I'm aware of that.

20 Q. Okay. And do you recall seeing this spray
21 field? This is a very flat field, is it not?

22 A. I believe that's correct.

23 Q. Okay. And so at least if the BMPs are
24 completely successful in stopping the movement of
25 phosphorus into adjoining waters, you don't have any

1 concern about Watts lagoon, do you?

2 A. You're partially correct. It really depends
3 on whether or not there's a ditch system or some way
4 to move that effluent water directly to the river. I
5 know there was some discussion in some of the material
6 that I read about Watts that there was a swale there,
7 and so I think it's a matter of -- the fact that it
8 was raised as a potential problem by U.S. Fish and
9 Wildlife Service and that they were fined would
10 suggest to me that someone doing an assessment should
11 at least look at it. But I would agree with you that
12 it's not high on my list of the most likely
13 contributors.

14 Q. But it was enough time to take our time
15 today?

16 A. I think that in doing an appropriate
17 assessment of what's going, that people -- when this
18 site is located on the main stem river right by the
19 border between the two states, an area that's in
20 dispute here about what's going on, I think that the
21 people doing the investigation should have looked at
22 it, yes.

23 Q. All right. Now, let's go down to -- let's go
24 back to one other, and we talked about urban briefly,
25 that there have been runoff issues.

1 In terms of the land-use maps for the IRW,
2 urban runoff is anywhere from five to seven percent in
3 those maps; is that not true?

4 A. Do you mean the percent of the area covered
5 by urban land use?

6 Q. Yeah.

7 A. About seven percent. I think that's about
8 right.

9 Q. Okay. And are you not also aware that
10 Dr. Engel assessed urban runoff and actually provided
11 in his mass balance for urban runoff?

12 A. His mass balance really has nothing to do
13 with evaluating the potential for urban areas to
14 contribute to streams. It's a totally different
15 issue.

16 Q. Okay. Did you not note that he assigned a
17 percentage of his mass balance -- a percentage in his
18 mass balance for urban runoff's contribution to this
19 watershed?

20 A. You're talking about when he did his
21 modeling?

22 Q. No. When he did his mass balance.

23 A. When he did his mass balance, I think that in
24 his -- I would agree in his mass balance that
25 he included in that what he believed to be phosphorus

1 being imported in the watershed with respect to urban
2 areas, but that's got nothing to do with in or out of
3 the stream system. It's a totally different issue,
4 the mass balance on the water versus the mass balance
5 on the watershed.

6 Q. Your testimony is that he did not include in
7 his mass balance anything for urban runoff?

8 A. No, I'm not saying that. I'm saying that he
9 did not include it -- nothing about his mass balance
10 was relevant to water quality issues.

11 Q. Doctor, I didn't ask that. I need to clarify
12 with you whether it is your view that Dr. Engel did
13 not assign in his mass balance any quantity for urban
14 runoff?

15 A. Dr. Engel did include urban in his watershed
16 mass balance. He did include it.

17 Q. Urban runoff?

18 A. I don't think it was expressed as runoff. I
19 think it was expressed as phosphorus into the
20 watershed.

21 Q. Okay. We won't fuss with one another as to
22 what's in the record. That doesn't get us to where
23 I'm going.

24 Let's talk about the Arkansas PI and Code
25 590. I guess, first, let's talk about generally.

1 Doctor, do you have any experience in working with
2 phosphorus indices?

3 A. With a phosphorus index?

4 Q. Yes.

5 A. Not outside of this case, no.

6 Q. And how did you become -- and the only one
7 that you have any familiarity with is the Arkansas
8 phosphorus index?

9 A. Well, I have some general familiarity with
10 the phosphorus index. I mean, as a general tool, it's
11 used by about 47 states. So I have a general
12 familiarity. The issues that are included in the
13 phosphorus index are issues that I'm well familiar
14 with, but I have not worked with phosphorus indices in
15 the past.

16 Q. How did you become familiar with phosphorus
17 indices?

18 A. Just by reading the publications. There was
19 a DeLaune, et al., 2004, I believe, that described the
20 phosphorus index.

21 Q. Doctor --

22 A. DeLaune, I think, is the correct
23 pronunciation, D-e-L-a-u-n-e, I believe. That was a
24 publication that discussed the phosphorus index for
25 Arkansas.

1 Then there's a recent publication that
2 Dr. Sharpley was involved with describing the revised
3 Arkansas phosphorus index that just went into effect
4 very, very recently.

5 Q. Okay. You don't consider yourself as an
6 expert in phosphorus indices, though, do you?

7 A. No, sir.

8 Q. And keeping with that, you certainly wouldn't
9 consider yourself to be an expert in Arkansas' new
10 phosphorus index, would you?

11 A. Well, I've read what it says. I would say my
12 expertise relates to looking at the parts of the -- of
13 the phosphorus index that apply to these issues of
14 hydrology and source and risk. I'm familiar -- well
15 familiar with those issues, that I can read them in
16 the papers.

17 MR. BULLOCK: Judge, I'm going to ask
18 that that be stricken.

19 THE COURT: Sustained.

20 Q. (BY MR. BULLOCK) Now, you certainly do not
21 consider yourself to be an expert with respect to
22 Arkansas' new phosphorus index, do you?

23 A. An expert, no.

24 Q. Are you aware of any research that quantifies
25 the amount of phosphorus that would be released from a

1 field if the phosphorus index is applied to that
2 field?

3 A. I can't think of any, no.

4 Q. Let's talk about 590, Code 590.

5 Before this case, had you worked with the
6 NRCS Code 590?

7 A. I've worked with some of the restrictions
8 that are embedded in the Code 590 in Oregon but not
9 specifically with the Code 590.

10 Q. And, again, are you aware of any research
11 that quantifies the amount of phosphorus that would be
12 released from a field if the NRCS Code 590 is applied
13 to that field?

14 A. I can't think of a specific study that
15 quantified that difference, no.

16 Q. Okay. Isn't one of the issues in terms of
17 nonpoint-source pollution similar to the saying of
18 death by a thousand cuts, that over a large area you
19 get a little bit of the mineral of concern, in this
20 case phosphorus, and together all of those make for
21 pollution of a waterbody?

22 A. That's the general understanding, yes.

23 Q. Okay. And so the actual effectiveness of
24 Code 590 is important, is it not?

25 A. I think that the effectiveness is important,

1 yes.

2 Q. Okay. Are you aware that Mr. Smith of
3 the -- or Mr. Earl Smith of the Arkansas Natural
4 Resources Commission has testified in this court that
5 the Arkansas phosphorus index has not stopped
6 nonpoint-source pollution from poultry waste?

7 A. I read Mr. Smith's testimony. I don't
8 remember that specific sentence so I guess I'm not
9 aware of that. But I did read the testimony.

10 Q. Okay. And if, in fact, he said that, you
11 wouldn't contradict that, would you?

12 A. I would say that for a scientist, it's not
13 possible to make that statement without the
14 appropriate research to demonstrate that. I don't
15 believe -- I certainly have not seen that research,
16 no.

17 Q. Okay. Are you aware of at what point in time
18 it became mandatory that persons applying poultry
19 waste in Arkansas follow or observe the requirements
20 of the PI index?

21 A. Well, the PI index was published in 2004, I
22 believe. It's -- it's -- and initially there was a
23 grace period so it's -- it's within the last several
24 years. I don't know precisely which year.

25 Q. 2007?

1 A. That's possible.

2 Q. Okay. And the waste applied before the
3 implementation of such an index, from your knowledge
4 of all of the areas in which you have expertise,
5 that waste still has the potential of polluting the
6 waters of the IRW, doesn't it?

7 A. I'm not sure I'm fully understanding the
8 question, though. Which waste are we talking about?

9 Q. Okay. Let's take -- even if you want to go
10 waste before 2004 in Arkansas, that waste, if it
11 wasn't applied with all of the restrictions that you
12 might suggest, would have the potential of continuing
13 to pollute this waterbody, would it not?

14 A. So are you talking about the phosphorus that
15 was applied before 2004 --

16 Q. Yes.

17 A. -- that would pollute today?

18 Q. Yes.

19 A. That's a good question, and I think it's a
20 very difficult question to provide an answer to.
21 Because over time the phosphorus from the fertilizer
22 is going to become incorporated into the soil, and
23 then -- a fresh application of fertilizer is far more
24 likely to move phosphorus with overland flow.

25 So the answer is I don't know. I think that

1 that's something that would need to be -- would need
2 to be investigated to provide an answer to that.

3 Q. You can't rule that out, can you?

4 A. I can't rule it out, no. But I can't rule it
5 in either.

6 Q. Okay. You didn't do any investigation or
7 analysis to determine whether poultry operations in
8 the Illinois River Watershed are, in fact, complying
9 with the requirements of any phosphorus index, did
10 you?

11 A. I didn't conduct any kind of a study to try
12 to determine the extent of compliance with any
13 regulations, no.

14 Q. And you wouldn't presume that merely because
15 people haven't been caught, that there aren't
16 violations of the law, would you?

17 A. Actually, I would presume that there are not
18 violations of the law, but I have no scientific
19 foundation to present to you for that. But I would
20 presume that to be true.

21 Q. So you would presume that because I don't get
22 a ticket going to Oklahoma City, that I didn't speed?

23 A. No, I wouldn't presume that. That's a
24 totally different issue.

25 Q. Okay. Let's --

1 MR. BULLOCK: If I might approach,
2 Judge?

3 THE COURT: Yes, sir.

4 THE WITNESS: Thank you.

5 Q. (BY MR. BULLOCK) Doctor, I've handed you
6 what's been marked Defendants' Joint Exhibit 2268. Do
7 you recognize that?

8 A. Yes, sir, I do.

9 Q. Okay. That's actually a schematic that was
10 included in your report?

11 A. Yes.

12 Q. Okay. And I'm going to use it here as a
13 demonstrative rather than offer it into evidence,
14 okay?

15 A. Okay.

16 Q. Now, this is a schematic demonstrating this
17 concept of critical source area; correct?

18 A. Yes.

19 Q. Okay. It's not data driven, it's merely
20 illustrative of the discussion point?

21 A. That's correct.

22 Q. Okay. So you have what is a high transport
23 area, and that would include someplace where the -- it
24 is likely that in this case phosphorus would be moved
25 off of a field and into waters; correct?

1 A. That there would be an increase risk of that
2 occurring.

3 Q. An increased risk. And then on the green
4 side, you have a high P source; correct?

5 A. Correct.

6 Q. Now, you haven't done anything in this
7 watershed, first of all, to determine on the basis of
8 your study where there are what might be regarded as a
9 high P source?

10 A. I have not done any independent investigation
11 of where the P sources would be high.

12 Q. And you don't -- you haven't expressed an
13 opinion in your report as to what that might be as
14 some type of an objective level?

15 A. In terms of what might constitute a high P
16 source?

17 Q. Right. What would be a high P source.

18 A. Well, that's something that's included in the
19 phosphorus index, but it's not something that
20 I -- that I tried to quantify in my report. You're
21 correct in that.

22 Q. You haven't determined that?

23 A. No.

24 Q. Okay. Now, under this, there is, for
25 instance -- and then that red is what you're talking

1 about in terms of a critical source area --

2 A. Yes.

3 Q. -- correct?

4 Under this schematic, there is testimony, for
5 instance, concerning the George's Ritter farm with an
6 STP value of 2,000, okay? Now, that would certainly
7 be a high P source under this.

8 You would agree with that, wouldn't you?

9 A. That would be -- as an STP, that would be a
10 component of a high P source. In the phosphorus
11 index, the other component is the water-extractable
12 phosphorus in the litter that's been applied. So both
13 of those are considered. But yes, that's certainly
14 part of it.

15 Q. But this was past litter application, Doctor.
16 So we're talking about some of this pre-2004.

17 A. Okay.

18 Q. Okay. Now, it would be your testimony that
19 unless the Ritter farm is in one of these high
20 transport areas, that under this there would be no
21 attention given to a piece of land with a 2,000 STP;
22 correct?

23 A. No. This is not evaluated on a farm-by-farm
24 basis. It's evaluated on a field-by-field basis.

25 Q. Well --

1 A. The evaluation is actually the portions of
2 the field that might be subject to transport. So you
3 don't expect the whole farm to be in that category,
4 no.

5 Q. We're talking about a specific field. That
6 specific field, the field with the 2,000 STP, your
7 testimony is that unless somebody goes out and proves
8 that that's in a high-transport area, there's no
9 reason for concern that it is contributing one of
10 those thousand cuts --

11 A. No.

12 Q. -- to the waters of the IRW?

13 A. No, that's not what I'm suggesting. What I'm
14 suggesting is that across that field an evaluation
15 will be made to determine the increased risk of
16 runoff, and that's made across the entire field. It's
17 not just a one number for one field. You look at the
18 soil types that occur across that field, you look at
19 the hydrologic soil type that occurs there, you
20 combine that with the vegetation coverage information,
21 you combine that with the slope, and you generate a
22 probability of increased runoff.

23 Q. Well, I'm --

24 A. And that's all done -- that information is
25 collected to feed into the phosphorus index, and

1 that's how the evaluation is made.

2 Q. Doctor, I'm not talking phosphorus index
3 here. And it looks like you and I are going to have
4 to spend more time on the phosphorus index than I had
5 anticipated.

6 But so far as you are concerned, a 2,000 STP,
7 until somebody proves it's in a high-transport area,
8 is going to be, like, locked up in your warehouse?

9 A. A 2,000 STP, if there's no transport, I mean,
10 it is essentially locked up if there's no mechanism
11 provided for transport.

12 Q. Okay. Now, as we said, this is a mere
13 schematic and you haven't evaluated the IRW in terms
14 of, first of all, how extensive the high P sources
15 might be in the IRW, have you?

16 A. I have not performed a study to try to
17 quantify that. That's something that's been addressed
18 by many other experts in this case.

19 Q. All right. And you haven't attempted to
20 evaluate the potential for high transport in the IRW,
21 have you?

22 A. Well, there's a lot of information on
23 potential for high transport in the IRW and elsewhere,
24 but I have not tried to conduct a field investigation
25 of that, no.

1 Q. All right. And so it is in a karst geology
2 with thin soils and a high concentration of cattle
3 which are having all of the impacts that you've
4 testified to here today -- or having impacts such as
5 you've testified to here today. It is possible that
6 this high transport area and the high source area, in
7 fact, completely overlap, isn't it?

8 A. Well, that's why they don't spread the litter
9 on the areas --

10 Q. Doctor, it is -- Doctor, it is possible that
11 the two completely overlap?

12 A. Are you talking about in terms of litter that
13 was spread in the past?

14 Q. No. I'm talking about your evaluation. You
15 cannot testify as to your expertise that the high
16 transport area and the high P source in this watershed
17 do not completely overlap, can you?

18 A. I don't know if there are areas of this high
19 P and high transport potential. I've not tried to
20 investigate that.

21 Q. Okay.

22 *(Discussion held off the record)*

23 Q. *(BY MR. BULLOCK)* The basis is, you can't
24 conclude as to how much those two overlap, can you?

25 A. How much high STP overlaps with high

1 transport, that's not an investigation I've tried to
2 conduct. I cannot tell you where they overlap.

3 Q. Okay. Let's go to --

4 MR. BULLOCK: If I might approach, Your
5 Honor?

6 THE COURT: You may.

7 THE WITNESS: Thank you, sir.

8 MR. BULLOCK: I'll try to make this
9 short so that you can get your --

10 MR. GEORGE: I have one objection but I
11 don't want to interrupt you. So let me make it now,
12 if I can.

13 MR. BULLOCK: Well, why don't you make
14 it. That way I can deal with it.

15 MR. GEORGE: Try to work together, Your
16 Honor.

17 Your Honor, the document's been handed up
18 that Mr. Bullock intends to examine Dr. Sullivan
19 concerning the revised phosphorus index, which I think
20 is something the court has taken judicial notice of.

21 I think the record will reflect that the
22 defendants did not solicit testimony from Dr. Sullivan
23 regarding the revised phosphorus index, and obviously
24 his report was written prior to the time that this
25 index came into me.

1 I am concerned that plaintiffs may be seeking
2 to open a door to rebuttal through the examination of
3 this witness, and I certainly want to reserve any
4 objections that we would have in that regard.

5 So I guess in terms of -- the formalness of
6 my objection is beyond the scope. If the court allows
7 it, I just want to make clear that we're not conceding
8 that rebuttal would be permissible on this point
9 simply because they examined a witness on cross.

10 MR. BULLOCK: Well, talk about
11 preemptory objections.

12 But even beyond that, the fact is that they,
13 defendants, introduced this very document to this
14 court --

15 THE COURT: Is this admitted, by the
16 way?

17 MR. BULLOCK: It is.

18 THE COURT: All right. It's obviously
19 relevant. It's been in place for now what, 12 days?

20 MR. BULLOCK: Yeah.

21 THE COURT: And when you're talking
22 about an equitable action, an action for injunction,
23 one of the questions going on in my multiple-working
24 hypothesis is to what extent the court has to consider
25 whether or not time must be given to see whether or

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1 not this is going to have any impact. I think we have
2 to get into it.

3 You know, this is one of the dynamic problems
4 with this subject matter. To the extent the lawsuit's
5 brought, I think it's a necessary subject. It was
6 admitted by the defendants. It's in place now for
7 twelve days, which is much shorter than this trial has
8 been going on. The objection's overruled.

9 Go ahead, Mr. Bullock.

10 Q. (BY MR. BULLOCK) Okay. Relative
11 to -- you've seen this. In fact, this is what you
12 were referring to in terms of the Dr. Sharpley matter
13 with the P index?

14 A. Yes, sir. I have seen it and I've read it
15 but I have not studied it.

16 MR. BULLOCK: This is, for purposes of
17 the record, Defendants' Joint Exhibit 8132.

18 Q. (BY MR. BULLOCK) And if you'll look -- let's
19 go to page 4 relative to the issue of additional
20 contributions from prior application. We'll go down
21 to the third paragraph where Dr. Sharpley writes,
22 "Research in Texas, Pennsylvania, and Georgia shows
23 that the mineralization of organic P in manure that is
24 not measured in WEP prior to application can
25 contribute an additional P in runoff. In other words,

1 there is a small but potentially significant residual
2 effect or the P release from litter during the year
3 after application, which contributes additional P to
4 runoff losses."

5 Do you see that?

6 A. Yes, I do.

7 Q. And that would be applicable to such places
8 as the Ritter farm with the 2,000 STP, would it not?

9 A. No, I would not agree with that, sir.

10 Q. Okay. Well, let's go back to the examples of
11 their application of the Arkansas P index. Go back to
12 page 13, Doctor.

13 You're not a -- okay. Go ahead.

14 A. I have page 13.

15 Q. Okay. You're not a plan-writer?

16 A. No, sir.

17 Q. Okay. And this is a rather complicated
18 calculation that needs some expert interpretation,
19 does it not?

20 A. I think that would be helpful.

21 Q. Okay. But down at the bottom of this
22 calculation, there is a line saying the estimated P
23 loss, pounds P per acre. Do you see that?

24 A. Yes, I do.

25 Q. And there are -- let's see. For all of the

1 applications -- and I'm looking at the examples from
2 pages 13 to 19 of this -- it does show some measurable
3 estimated P loss from all of these fields, doesn't
4 it?

5 A. I believe that that's true.

6 Q. Okay. Ranging from .43 pounds up to as high
7 as 1.79 pounds; correct? I guess 1.06 pounds would be
8 the lowest.

9 A. I believe you're correct on that,
10 Mr. Bullock.

11 Q. Okay. And that's the estimates even applying
12 the Arkansas P index; correct?

13 A. Well, the Arkansas P index is intended to
14 evaluate what the risk might be. Then based on what
15 that risk is calculated or estimated to be, then
16 certain management actions follow; for example, don't
17 spread litter or introduce additional BMPs and that
18 sort of thing.

19 Q. Okay. Well, this actually includes
20 calculation of those such matters, does it not, within
21 this calculation? Or do you know that?

22 A. Well, within the calculation, it does include
23 allowance for some -- for the existing BMPs, at least
24 some of the existing BMPs, yes.

25 Q. Okay.

1 A. But depending on how the final rating is
2 determined from the calculation, then that will
3 instruct the farmer whether litter may be applied or
4 not, and if it is applied, what the various
5 restrictions are.

6 I'm a little bit nervous about this testimony
7 because I'm really not an expert on what's in this
8 paper. I understand why Your Honor wants me to talk
9 about it but --

10 MR. BULLOCK: Okay. And I have just one
11 other question on this. I didn't mean to cut off your
12 objection.

13 MR. GEORGE: Well, let me hear it. I
14 may have still have it.

15 MR. BULLOCK: Okay.

16 Q. (BY MR. BULLOCK) Are you not aware that, in
17 fact, this basically is -- I guess I'm going to have
18 two -- this is basically an instruction to the
19 plan-writers or an explanation to the plan-writers?

20 A. It's an explanation to the plan-writers is
21 how I would interpret it.

22 Q. Okay. Now, in fact, this provides, does it
23 not, that the farmer will not be told what the
24 estimate of runoff is from the fields where he is
25 applying the waste? Isn't that true?

1 A. The farmer will be told -- well, my
2 understanding is the farmer will be told whether the
3 calculated risk is low -- I believe that there's a
4 very low, there's a low, there's a moderate, there's a
5 high, and a very high. The farmer will be told what
6 the results of that calculation is, and then
7 associated with those designations will be various
8 requirements.

9 Q. Okay. But let me go to page 2, the bottom
10 sentence on page 2.

11 MR. GEORGE: Your Honor, I do object to
12 this line of questioning. It is well beyond the
13 scope. I don't believe we elicited any testimony
14 about what farmers would or would not be told from
15 this witness. Anything he would have to say about
16 that would be speculation.

17 MR. BULLOCK: In terms of his testimony
18 that he just gave, which was completely voluntary as
19 to what farmers will be told, and now I ought to be
20 able to complete the circle as to what farmers won't
21 be told.

22 MR. GEORGE: I apologize, Mr. Bullock.
23 The document is in evidence. And if His Honor wants
24 to read it and there's something in there about what
25 growers will be told, then that's before the court.

1 Having this witness read from a document that he's
2 indicated he doesn't have particular expertise, and
3 now we're even beyond exploring scientific testimony
4 matters, I think is relevant.

5 THE COURT: It's in evidence. I'm going
6 to read it. The objection's sustained.

7 *(Discussion held off the record)*

8 THE COURT: All right. I'm told by
9 Mr. Overton that this is not in evidence.

10 MR. GEORGE: Your Honor, I believe the
11 court took judicial notice of it. But maybe I was
12 loose in my -- maybe we've all been loose in our
13 discussion of it.

14 MR. BULLOCK: I guess that's always a
15 question as to what judicial notice is. But --

16 THE COURT: Well, I mean, it may be that
17 I took judicial notice of the fact that the revised
18 Arkansas phosphorus index went into effect as of
19 January 1st of this year. I don't know that I took
20 judicial notice of this document, did I?

21 MR. GEORGE: You did, Your Honor. And
22 I'll try to reset the stage.

23 You'll recall we had -- Your Honor took
24 judicial notice of the revised rules and regulations,
25 and included in those rules and regulations was a

1 reference to this article --

2 THE COURT: There you go. So it's
3 incorporated therein. Thank you for the reminder.

4 So by virtue of the fact that it's reference
5 in the rules it bootstraps in this description. Thank
6 you very much.

7 MR. BULLOCK: I think that was the
8 explanation.

9 THE COURT: Thank you very much. Once
10 again, evidence of the volume involved here. I'm glad
11 that none of you have exhibited perfect recall either.

12 Mr. George.

13 MR. GEORGE: Thank you, Your Honor.
14 Without adding much to what we have to recall, I do
15 have just a few questions.

16 THE COURT: Although Mr. George has come
17 pretty close.

18 MR. GEORGE: I don't know. There are
19 moments when it feels like it's all coming out so we
20 try to retain it.

21 **REDIRECT EXAMINATION**

22 **BY MR. GEORGE:**

23 Q. Doctor, I want to start with the phosphorus
24 index document that we've been discussing and I want
25 to just clear up a thing or two.

1 Do you still have it in front of you?

2 A. Yes, sir.

3 Q. Okay. You were asked about example 1 and
4 then there was reference made to some of these other
5 examples. Do you understand that these are sort of
6 hypothetical fields?

7 A. That's my understanding, yes.

8 Q. Okay. And Mr. Bullock asked you about the
9 estimated phosphorus loss that's reported in some of
10 these hypotheticals. Do you recall those questions?

11 A. Yes.

12 Q. Okay. And I believe you acknowledged that
13 these estimates report some measurable estimate of
14 phosphorus loss from a pasture; right?

15 A. An approximation, yes.

16 Q. Okay. Doctor, do you have to apply poultry
17 litter to get measurable phosphorus losses from
18 pastures?

19 A. No, sir.

20 Q. Okay. Have you studied how the phosphorus
21 loss estimates shown in these four examples compare to
22 phosphorus losses on pastures that have not received
23 poultry litter?

24 A. No, I have not made that comparison.

25 Q. Okay. You were also asked on page 4 of the

1 document about mineralization and the residual effect
2 of phosphorus lease -- or release. Do you recall
3 that question?

4 A. Yes.

5 Q. And the sentence there that is discussed is
6 talking about a residual release a year after
7 application; is that right?

8 A. That's right.

9 Q. Okay. If you read the very next sentence --
10 and read it to yourself first, Doctor -- is it true
11 that one of the adjustments that was made in the
12 phosphorus index was to add a mineralization factor to
13 address that?

14 A. That's true. But I don't see which sentence
15 I was supposed to read.

16 Q. I'm sorry. The sentence that begins with
17 "hence."

18 A. Hence, yes.

19 Q. Okay.

20 A. I see that.

21 Q. All right. Doctor, you were asked about some
22 of the potential sources, and I believe a fair
23 characterization of the cross was that Mr. Bullock
24 believes that some of the sources that you identified
25 might be small and within the context of the entire

1 watershed. You were asked about septic tanks, for
2 example, as one example of that.

3 Doctor, can a potential source that may be
4 small in the scale of the entire million-acre
5 watershed nonetheless have a large localized impact on
6 water quality in small streams?

7 A. Yes, it can.

8 Q. And we saw in your spatial analysis, didn't
9 we, that there are a few small tributaries that are
10 not downstream from either urban areas or
11 wastewater-treatment plants that have some elevated
12 phosphorus readings; correct?

13 A. Correct.

14 Q. Okay. Can sources, such as septic tanks or
15 even dirt roads, account for or perhaps influence
16 those elevations in phosphorus readings in some of
17 these localized areas?

18 A. Well, whether or not they would account for
19 them is really difficult to say without doing a proper
20 study. But, I mean, certainly there's a lot of
21 information in the scientific literature on the
22 importance of septic systems and the importance of
23 erosion, including bank and road erosion, on
24 phosphorus contributions.

25 So the sufficient justification, based on the

1 scientific literature, that one would want to look at
2 that issue, particularly in these smaller basins.

3 Q. Okay. Doctor, you were asked about the Watts
4 sewage lagoon. Do you recall that?

5 A. Yes, I do.

6 Q. And we went to your table and found the
7 number of people that are serviced by that lagoon.

8 Do you recall whether there's been a history
9 of a large release from that lagoon?

10 A. Yes, there was.

11 Q. Do you recall the quantity?

12 A. I don't recall -- I don't recall the number.
13 It was a large release for which Watts was fined by
14 the DEQ.

15 Q. Let me ask you to refresh your recollection.
16 Do you have your report with you?

17 A. Yes, I do.

18 Q. And could you find it and turn to page 33 of
19 your report?

20 A. Okay. I have page 33.

21 Q. Okay. And if you could just look at the last
22 paragraph on page 33 and see if that refreshes your
23 recollection as to the size of that release.

24 A. Yes. Thank you, Mr. George. It was 275,000
25 gallons of treated wastewater.

1 Q. Now, Doctor, you were asked about Defendants'
2 Joint Exhibit 2268, which is this schematic --

3 A. Yes.

4 Q. -- where the high source and the high
5 transport intersect to create a critical source area.
6 Do you recall that?

7 A. Yes.

8 Q. And Mr. Bullock asked you whether you had
9 identified the specific areas in the watershed of high
10 phosphorus source and high potential for transport
11 overlap. Do you recall that?

12 A. Yes.

13 Q. And I believe you testified that you had not
14 evaluated that issue on a field-by-field basis;
15 correct?

16 A. Correct.

17 Q. Is it your understanding that's what
18 plan-writers do?

19 A. Yes, it is.

20 Q. Okay. Do you have any reason, Doctor, to
21 believe that the plan-writers -- who have to be
22 certified; right?

23 A. Correct.

24 Q. Have to be trained soil scientists?

25 A. Yes, sir.

1 Q. Do you have any reason to believe that they
2 are unfamiliar with the geographic setting and the
3 karst terrain of the Illinois River Watershed?

4 A. I have no reason to believe that.

5 Q. Okay. Doctor, you were asked at one point by
6 Mr. Bullock if you would presume that farmers violate
7 the rules but don't get caught. Do you recall that?

8 A. Yes, I do.

9 Q. And I believe you said you would not engage
10 in that presumption?

11 A. I would not presume that, no.

12 Q. Why not?

13 A. For three reasons. One is that the
14 plaintiffs hired a rather substantial number of
15 investigators to investigate and did not report that
16 they had found such violations. I believe it was
17 Dr. Fisher who testified to that but I'm not positive
18 it was Dr. Fisher. So that's the first reason.

19 The second reason is is that it's my
20 belief -- and, again, I don't have scientific
21 documentation for this -- it's my belief that the
22 farmers here are scared. That was told to me by a
23 couple of farmers but I believe that to be true.

24 MR. BULLOCK: Your Honor, this is
25 complete total hearsay.

1 THE COURT: Sustained.

2 Q. (BY MR. GEORGE) Dr. Sullivan, have you had
3 in-the-field experience working with farmers on
4 conservation practices before?

5 A. Yes, I have.

6 Q. Have you generally found them to be
7 individuals who take seriously their obligations of
8 stewardship?

9 A. That's what I found, yes.

10 MR. BULLOCK: Objection to leading.

11 THE COURT: Sustained.

12 MR. GEORGE: I'll pass the witness, Your
13 Honor.

14 THE COURT: Recross?

15 MR. BULLOCK: I'm going to surrender the
16 witness, Judge.

17 THE COURT: You're free.

18 THE WITNESS: Thank you, sir.

19 THE COURT: Thank you. The defendants
20 may call their next witness.

21 MR. TODD: Your Honor, the last thing we
22 have in the hopper for today is the video
23 deposition --

24 MR. GEORGE: Can I do this first?

25 MR. TODD: Oh, sure.

1 MR. GEORGE: I'm sorry. I apologize for
2 interrupting Mr. Todd, Your Honor. But there's one
3 matter I wanted to bring to the court's attention, and
4 it relates to the examination of Dr. Vic Bierman that
5 we had earlier this week. I believe it was this week.
6 I may have lost track.

7 There's one exhibit, upon further discussion
8 with Dr. Bierman, I have come to conclude contains an
9 error. As an officer of the court, I can't in good
10 conscious allow it to stand in the record. It is
11 Defendants' Joint Exhibit 2415.

12 And Your Honor will recall that it's the one
13 where Dr. Bierman was showing the relative size of the
14 increases that he applied to point and nonpoint
15 sources in one of his tests. And for the record --

16 THE COURT: Just one second.

17 MR. GEORGE: Oh, sure. I'm sorry, Your
18 Honor.

19 THE COURT: You don't happen to remember
20 what tab it is here, do you?

21 MR. GEORGE: Oh, my goodness.

22 THE COURT: Oh, I've got it. I've got
23 it. Tab 3.

24 MR. GEORGE: You got it. Okay.

25 THE COURT: All right.

1 MR. GEORGE: Your Honor, the bottom
2 panel which relates to nonpoint sources in the copy
3 that has been supplied to the court and admitted --

4 THE COURT: Yes, sir.

5 MR. GEORGE: -- is, in fact, a mistake
6 in copying the same graphic from the top.

7 THE COURT: It looked -- in fact, there
8 was questioning by the plaintiff --

9 MR. GEORGE: There was.

10 THE COURT: -- in that regard.

11 MR. GEORGE: That's what prompted our
12 review, Your Honor.

13 THE COURT: Thank you.

14 MR. BULLOCK: And I would object to
15 further argument or substitution of other exhibits at
16 this point. They can withdraw it, if they wish, but
17 the record is as it is.

18 MR. GEORGE: Your Honor, I am not trying
19 to catch Mr. Bullock by surprise and have no intention
20 to substitute an exhibit. I believe we have two
21 courses of action.

22 One would be to redact the bottom panel which
23 we know is in error. The other would be to withdraw
24 the entire exhibit. And I'm amenable to either one,
25 Your Honor.

1 MR. BULLOCK: Well, I think that since
2 he was questioned concerning it and asserted its
3 accuracy, the defendants have stated that it was in
4 error at this point, but the record ought to stand.
5 Otherwise, you're striking our cross which appears to
6 be a unique way to deal with a witness
7 mistestifying.

8 THE COURT: I think there's a third way
9 to handle it here. Just to thank Mr. George for
10 clarifying the record. The record stands as it is.
11 Obviously, the bottom diagram has been disavowed.

12 MR. GEORGE: Correct, Your Honor.

13 THE COURT: We thank you very much.

14 MR. GEORGE: Your Honor, I would point
15 out it doesn't change any of the substantive testimony
16 of the witness. So we're not seeking to modify
17 the --

18 THE COURT: Other than the fact that he
19 said that it's on such a scale that you simply cannot
20 perceive the differences. So it obviously does affect
21 the substantive testimony.

22 MR. GEORGE: Thank you, Your Honor.

23 MR. BULLOCK: All right.

24 THE COURT: Yeah. That one left me
25 scratching my head. Go ahead.

1 MR. TODD: Your Honor, the last thing we
2 have today is the deposition of Terry Peach. I
3 believe this would be Court Exhibit 15. The runtime
4 is one hour and one minute so it's going to take us a
5 little past five. We can break it up or do the whole
6 thing as for the court's pleasure.

7 THE COURT: Let's get started.

8 MR. TODD: Okay.

9 *(Videotaped deposition of Terry Peach was played)*

10 THE COURT: While we're waiting here, I
11 take it we need to admit this deposition as a court's
12 exhibit?

13 MR. TODD: Yes, Your Honor.

14 THE COURT: And this should be somewhere
15 around 14 or 15?

16 MR. TODD: Fifteen.

17 THE COURT: Very well. Any objection?

18 MR. NANCE: No, Your Honor.

19 THE COURT: Very well. Court's Exhibit
20 No. 15, which represents the deposition of Terry
21 Peach, designations and counter designations, will be
22 admitted.

23 MR. TODD: Thank you, Your Honor.

24 *(Videotaped deposition of Terry Peach is continued)*

25 MR. TODD: Your Honor, it's five

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1 o'clock. We're about halfway through I think at least
2 by the words on the page --

3 THE COURT: Let's knock it out.

4 *(Videotaped deposition of Terry Peach is continued)*

5 MR. TODD: That's it. And the documents
6 referenced in that are all either laws, regulations,
7 or already in evidence.

8 THE COURT: Thank you very much.

9 MR. TODD: Thank you, Your Honor.

10 *(The proceedings were recessed)*
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C E R T I F I C A T E

I, Brian P. Neil, a Certified Court Reporter for the Eastern District of Oklahoma, do hereby certify that the foregoing is a true and accurate transcription of my stenographic notes and is a true record of the proceedings held in above-captioned case.

I further certify that I am not employed by or related to any party to this action by blood or marriage and that I am in no way interested in the outcome of this matter.

In witness whereof, I have hereunto set my hand this 12th day of January 2010.

s/ Brian P. Neil

Brian P. Neil, CSR-RPR, CRR, RMR
United States Court Reporter